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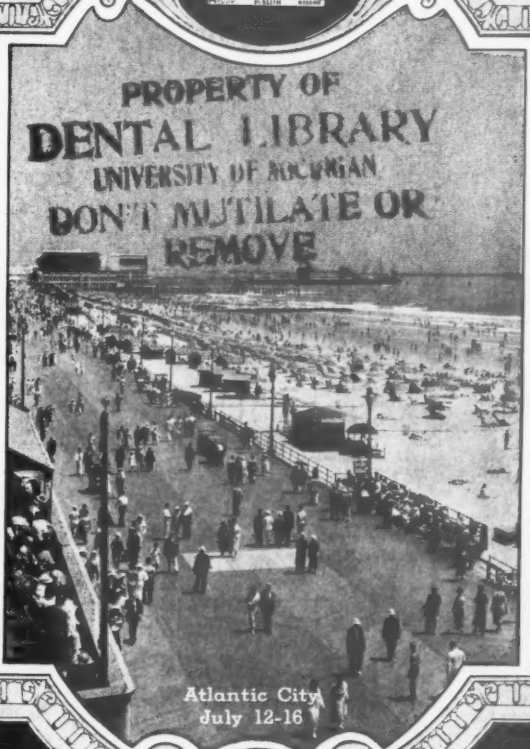

Atlantic City
July 12-16

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COMMITTEE ON LOCAL ARRANGEMENTS
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Vol. 24 JUNE 1937 No. 6

ARE PULPS AND INVESTING TISSUES OF COMPLETELY EMBEDDED TEETH INFECTED?

By WILLIAM H. G. LOGAN, M.D., D.D.S., Chicago, Ill.

OUTLINE OF PROGRAM

MUCH diversity of opinion exists as to the pathologic and clinical significance of completely embedded teeth. Some investigators consider them merely a continuation of the preëruptive state and attach no significance to their prolonged presence. Others, however, report the finding of pathogenic microörganisms in the pulps and investing tissues of completely embedded teeth and consider them as being a serious potential or an actual menace to the patient's health (Lucas,[1] Ito[2]).

The scarcity of suitable material available for histologic study constitutes one of the main difficulties encountered in any attempt to determine the true status of completely embedded teeth. Although it is easy to procure embedded teeth that have been removed surgically, such specimens make available only certain information about the pulp, but they do not grant an opportunity for the very definitely needed histopathologic study of the investing structures of the embedded tooth in question. The latter can be ascertained in its entirety only by a study of histologic sections through human jaws containing completely embedded teeth, obtained either by autopsy or by surgical resection. This report, based upon the findings in several such specimens, does not include partially erupted teeth or teeth that have been removed surgically without the investing tissues.

We can perhaps avoid misinterpretation by giving the definition of the term, "a completely embedded tooth," as used in this report. This term is applied to a tooth that has failed to erupt at the normal period, and is covered by an unbroken layer of soft tissue or by bone and soft tissue. Teeth that have any communication with the oral cavity, even to a minor degree, are classified as partially

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(Read before the Section on Oral Surgery, Radiology and Anesthesia at the Seventy-Third Annual Midwinter Meeting of the Chicago Dental Society, February 17, 1937.)

erupted. The importance of this distinction will be considered later.

REVIEW OF LITERATURE

Our review of the literature is confined to reports showing completely embedded teeth *in situ* and describing the surrounding structures. But the number of such reports is small because of the great difficulty in obtaining human jaw material containing embedded teeth.

Kotanyi,[3] in 1924, reported the histologic findings in three fully embedded teeth, namely, two upper cuspids and one upper third molar. These teeth were part of the large collection of sections through human jaws which were prepared at the Histologic Laboratory of the Dental Institute of the University of Vienna, under the direction of Dr. Gottlieb. Kotanyi gave a detailed description of the tissues surrounding the embedded teeth, special attention being called to the presence of deposits of cementum on the crown of the embedded third molar and to the resorption of the roots of the lateral incisors,

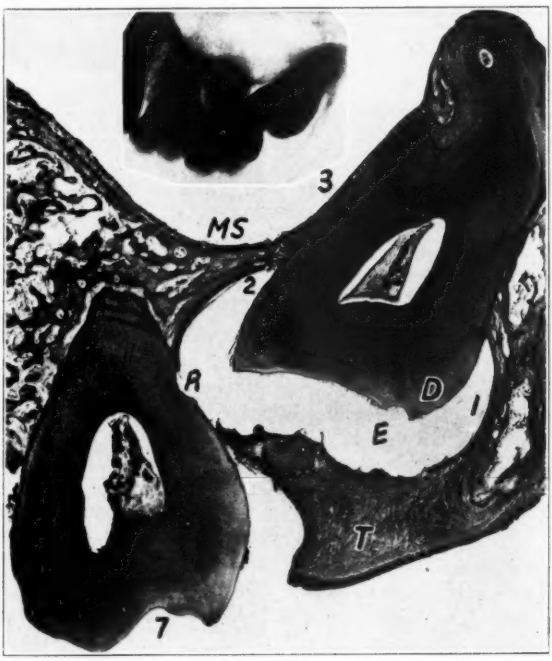

Fig. 1 (Case I).—Mesiodistal section through the erupted upper right second molar and the completely embedded third molar of a man thirty-two years of age. The roentgenogram taken before decalcification of the specimen shows the upper molars and the large antrum: T, Connective tissue of maxillary tuberosity; E, enamel space; D, dentin of the fully embedded third molar; MS, maxillary sinus; 7, crown of second molar; R, small area of resorption on distal surface of root of second molar. The areas marked 1, 2 and 3 are shown in higher magnification in Figures 2, 3 and 4.

caused by the impinging crowns of the cuspids. His specimens do not show evidence of inflammatory tissue reaction in the structures surrounding the embedded teeth.

Bauer,[4] of Innsbruck, described the histologic findings in a completely embedded upper cuspid. The crown of this tooth presented extensive resorption of enamel and dentin, with replacement of the dental tissues by bone and bone marrow. Neither the pulp of this tooth nor the pericoronary tissues, in so far as they were present, showed any evidence of inflammation.

Two more fully embedded teeth that had been found in the material of the Vienna collection since Kotanyi's publication were reported by Kellner[5] in 1931. One of these was an upper cuspid; the other, a lower second bicuspid. Kellner, being particularly interested in the structure of the periodontal tissues under various functional conditions, studied these two embedded teeth mainly from the viewpoint of comparing their cementum and periodontal membrane to that of erupted, occluding teeth in the same jaw. From Kellner's excellent photomicrographs and from a microscopic examination of some sections of this material, it is evident that pulp and supporting tissues of these teeth were normal and free from inflammation.

Mention should also be made of a report by Worman,[6] who had studied sections through the jaws of a dog, containing several completely and partially embedded malformed canines and premolars. All of the embedded teeth revealed extensive resorption of their crowns and roots, with subsequent fusion of the jawbone with the enamel and dentin. Inflammatory processes were present only where the teeth had partially erupted and the areas of resorption were in communication with the oral cavity. The important conclusions drawn from these findings will be found under the subheading, "Resorptive Processes in Completely Embedded Teeth," in the latter part of this report.

Thus a survey of the dental literature

Fig. 2.—Higher magnification of area 1 in Figure 1. Tooth follicle and bone on distal side of crown of embedded third molar: E, Enamel space; EE, enamel epithelium; TF, fibrous tissue of tooth follicle; B, bone.

reveals that, in so far as we have been able to ascertain, only six completely embedded human teeth have been described *in situ*. Of these, five were intact and one extensively resorbed. From the authors' descriptions and illustrations and from an examination of the actual specimens in two cases, it appears that an infective inflammatory process was not present in either pulp or investing tissues of any of these teeth.

CASE I. The specimen consisted of the maxillae and the mandible of a male Negro thirty-two years of age. The clinical history was one of chronic arthritis. The patient was admitted to the hospital, with acute arthritis in elbow and knee joints and beginning pneumonia, succumbing to the latter. The autopsy revealed pneumonia and pleurisy, endocarditis, pericarditis and arthritis. All the maxillary teeth were in place with the exception of the

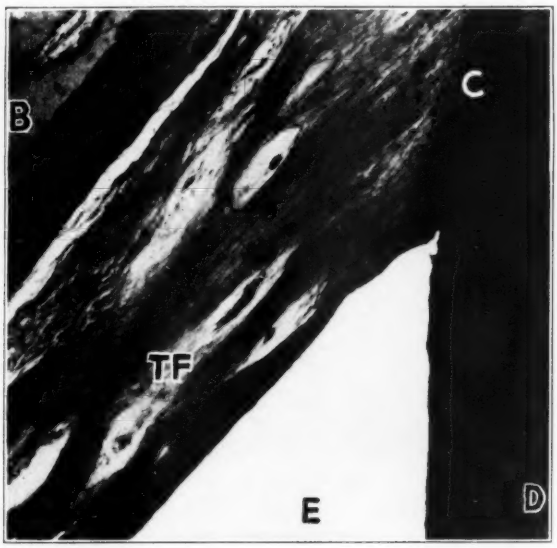

Fig. 3.—**Higher magnification of area 2 in Figure 1.** Cemento-enamel junction on the mesial side of crown of embedded third molar: D, Dentin; C, cementum; E, enamel space; TF, fiber bundles of tooth follicle attached to the cementum; B, bone.

AUTHOR'S MATERIAL

The two completely embedded teeth which are the subject of our own observation are an upper and a lower third molar in two different jaw specimens. For convenience, they will be designated as Case I and Case II. An additional specimen, Case III, is that of a fully embedded lower third molar with the overlying tissues which was obtained by biopsy.

fully embedded upper right third molar. In the lower jaw, the first and second molars on both sides were extensively decayed; the pulps were invaded with microörganisms, and periapical involvement was present.

The jaws were treated in the usual manner; casts and roentgenograms were made, the specimens were decalcified, embedded in celloidin, sectioned and stained

with hematoxylin and eosin, and Gram-Weigert stain.

Figure 1 is a general view of the section through the erupted second and the embedded third molar. The latter lies in the tuberosity, close to the floor of the antrum; its mesial cusp is in contact with the distal surface of the root of the second molar. At the point where the two teeth came in contact, a shallow resorption occurred on the distal surface of the second molar in the middle third. The areas marked 1, 2 and 3, in Figure 1, are reproduced in higher magnification in order to illustrate the condition of the surrounding structures.

Figure 2 is a section of the fibrous capsule on the distal side of the crown of the embedded tooth. The thin enamel epithelium is covered by fibrous connective tissue, which is arranged in a circular course around the crown. The entire structure does not differ from that present in any young tooth after the enamel is completed and before the crown has erupted. At the cemento-enamel junction (Fig. 3 [area 2 of Fig. 1]), the connective tissue of this fibrous capsule is attached to the cementum and is continuous with the periodontal membrane. The latter is thin and atrophic, and its fibers run mostly parallel to the tooth surface (Fig. 4 [area 3 of Fig. 1]). This structure of the periodontal membrane is characteristic of teeth which have no antagonists or for other reasons are not subjected to functional stimuli, as described by Box,[7] Coolidge,[8] Gottlieb,[9] Kellner,[5] Kronfeld[10] and Orban[11] in their histologic studies of teeth under abnormal functional conditions. The lamina of alveolar bone surrounding the root is also very thin. On the mesial side of the root and above the apex, this bone plate forms the separation between the periodontal membrane and the mucous membrane of the maxillary sinus (Fig. 4).

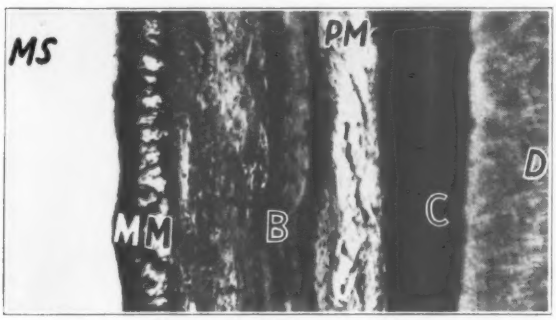

Fig. 4.—Higher magnification of area 3 in Figure 1. Mesial surface of root of embedded third molar: D, Dentin; C, cementum; PM, thin, atrophic periodontal membrane; B, bone; MM, mucous membrane of maxillary sinus; MS, maxillary sinus.

A study of the pulp tissues of the embedded third molar shows moderate atrophy and fibrosis; the odontoblastic layer is almost entirely missing. In addition, the pulp contains a large number of pulp calcifications, varying in size from barely visible calcific deposits in the fibrillae of the pulp tissues to fairly large pulp stones (Fig. 5). Palazzi[12] gave a detailed description of these same pulp changes in a completely embedded third molar which had been removed surgically.

Such pulp changes could easily be misinterpreted by those unfamiliar with the histology and physiology of the dental pulp. In fact, pulp fibrosis and pulp calcifications have been described as evidences of infection (Henrici and Hartzell,[13] Kretschmer and Seybold[14]). On the other hand, there are several reports which indicate very plainly that pulp calcifications are not dependent for their occurrence upon the effects of pathogenic microörganisms on the pulp tissue (Stafne and Szabo,[15] Hill,[16] Willman[17]). Hill states that what might be called a "normal" pulp is found, as a rule, only in the first few years following the eruption of a tooth. In a slightly older pulp, one may expect evidence of atrophy, fibrosis, vacuolization of the odontoblasts and calcifications. We now know that pulp calcifications can be anticipated in more than 90 per cent of all adult teeth. They are also found in the teeth of children, and Willman has set forth the presence of pulp stones in an unerupted bicuspid of a child of eleven. All of these changes belong to the normal picture of involution of the human pulp, and should not be misinterpreted as being associated with infective involvement of the pulp tissue. Hill has emphasized this in his statement that throughout life there is a gradual histologic change in all pulps; the amount of embryonal tissue and the number of stellate cells are reduced, and fibrosis of the pulp develops.

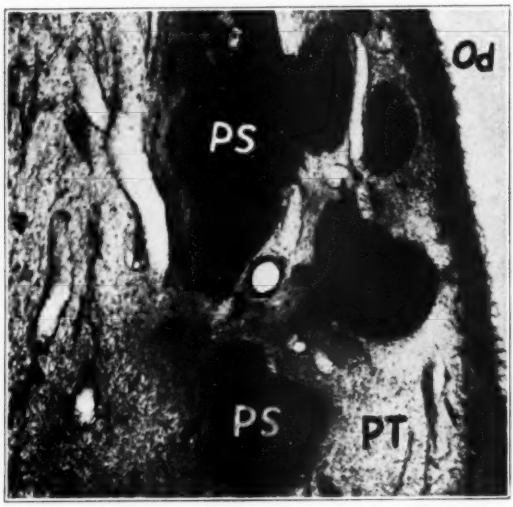

Fig. 5.—Pulp of embedded tooth: Od, Odontoblastic layer; PT, atrophic fibrous pulp tissue; PS, pulp stones (denticles) of different sizes. (Compare with Figure 6.)

A comparison of the pulps of the embedded third molar and the intact erupted second molar reveals almost identical changes in these two tissues (Fig. 6). Both show fibrosis and numerous small and larger pulp stones, and are free from inflammatory reactions. Bacteria were not found in the structures when submitted to the Gram-Weigert stain. In addition, fibrosis of the pulp tissues and pulp

stones were found in all of the other intact teeth of the same jaw which were sectioned.

This study of a number of pulps taken from the same mouth reveals the danger of drawing hasty conclusions from incomplete findings. If this embedded third molar had been removed surgically and the above-described pulp conditions found in it, the conclusion could easily have been reached that the pulp changes might have been due to the fact that the tooth was embedded. However, since all of the teeth of this individual showed almost identical pulp changes, such a conclusion would have been erroneous.

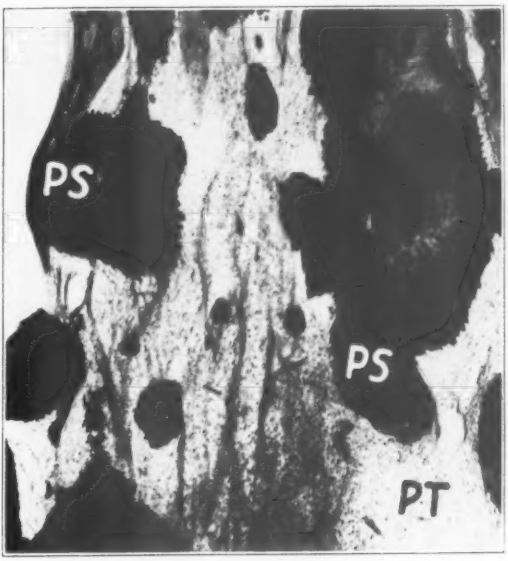

Fig. 6.—Pulp of erupted second molar: PT, Atrophic fibrous pulp tissue; PS, pulp stones (denticles) of different sizes.

Case II. The second completely embedded tooth considered in this study is a lower third molar which was found in the edentulous posterior portion of the mandible of a man of thirty-six years, who had died of lobar pneumonia. His teeth showed evidence of great neglect and dental disease; in the upper jaw only a few intact teeth were left, but numerous broken-down roots, with large apical granulomata and radicular cysts, were present. In the lower jaw there were two incisors, two cuspids, one bicuspid and one infected root fragment of a bicuspid present (Fig. 7). The left posterior part of the body of the mandible which contained the embedded tooth was edentulous, smooth and even in outline, and showed only a slight bulging in the region of the third molar. On the right side of the mandible an erupted intact third molar was present.

The histologic sections through the left lower molar region reveal a completely embedded third molar (Fig. 8). The tooth shows a marked mesial inclination.

Its root is firmly embedded in the jaw bone; its crown ends approximately in the level of the bone surface, and is covered by a layer of dense, fibrous connective tissue and by the oral mucosa. This tissue overlying the crown is illustrated in Figure 9; it consists of densely interwoven bundles of collagenous connective-tissue fibers, and is entirely free from inflammatory exudate cells or any other evidence of an inflammatory reaction (Fig. 10). The periodontal membrane shows the same

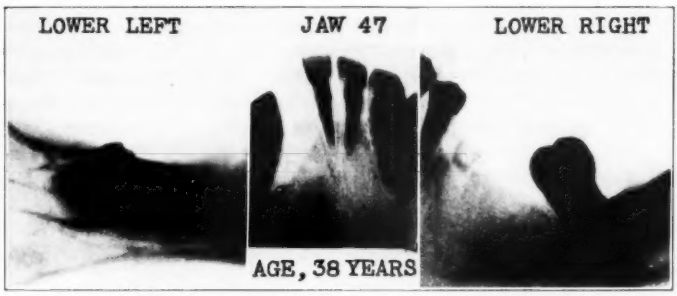

Fig. 7 (Case II).—Roentgenograms of the lower jaw of a man thirty-eight years of age. Completely embedded lower left third molar. Anterior teeth with advanced pyorrhea pockets. Small infected root fragment of lower right first bicuspid. Erupted lower right third molar.

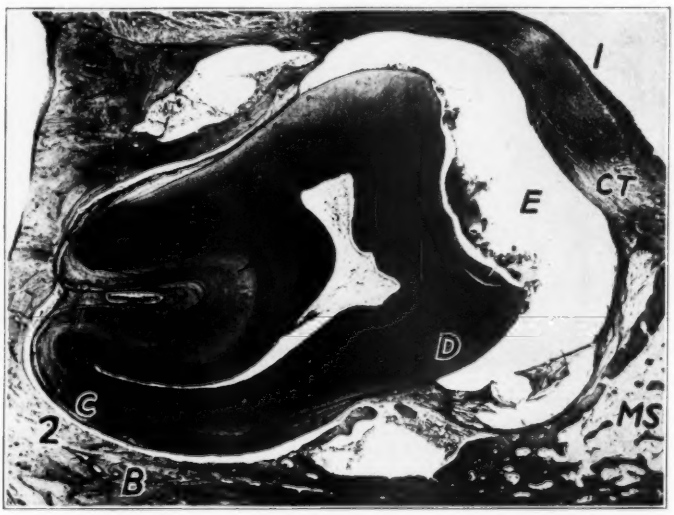

Fig. 8.—Mesiodistal section through the completely embedded lower left third molar: CT, Oral mucosa and connective tissue covering crown; E, enamel space; D, dentin; C, thick layers of cementum; B, bone; MS, marrow spaces. The areas marked 1 and 2 are shown in higher magnification in Figures 9, 10 and 11.

structural characteristic as that of the completely embedded upper third molar in Case I; it is thin, atrophic, and lacks the characteristic fiber bundles of a normal periodontal membrane (Fig. 11). This becomes particularly evident if the periodontal membrane of the embedded third molar is compared with that of the erupted third molar on the other side of the same jaw; the periodontal membrane of the latter is strong and fibrous, and more than twice as thick as that of the embedded tooth. The root of the embedded tooth is covered by very heavy layers of cementum, this being considerably thicker than that of the corresponding tooth on the opposite side, an observation which has already been reported by Kellner[5] and Zemsky.[18]

Fig. 9.—Higher magnification of area 1 in Figure 8. Tissue overlying crown of completely embedded tooth: OE, Oral epithelium; CT, dense fibrous connective tissue of lamina propria and tooth follicle; EE, enamel epithelium.

The pulps of both the embedded and the erupted lower third molars showed a similar degree of vacuolization of the odontoblasts and of atrophy and fibrosis of the pulp stroma. The erupted molar contained several small round areas of pulp calcification.

Bacterial stains of the sections through the two molars revealed the presence of the usual mixed oral flora on the surface of the mucous membrane and of the erupted tooth; no microörganisms were found in the periodontal membrane or in the pulp of either molar.

In summarizing the findings in Cases I and II, it can be concluded that both these fully embedded molars, like the other five described by Kotanyi and Kellner, presented the condition of normal, unerupted, quiescent teeth. Despite the presence of abundant chronic dental infection in the vicinity, none of the embedded teeth showed evidence either of microörganisms or of an inflammatory reaction. The pulps had undergone regressive changes of the nature characteristic for adult pulps. Similar pulp changes were also found in the intact erupted teeth of the same individuals.

Case III. This specimen of the fully embedded third molar, removed surgically from a male of seventeen years, is included in this report because it was possible to excise the tooth with its overlying soft tissues (Fig. 12). The fibrous tissue covering the crown is free from cellular infiltration (Fig. 13). The pulp is of the juvenile type, very cellular and well vascularized and without any regressive

changes (Fig. 14). The roots are not yet completed.

RESORPTIVE PROCESSES IN COMPLETELY EMBEDDED TEETH

The resorptive processes associated with completely embedded teeth can be divided into two distinct groups: (A) Resorption of the embedded tooth; (B) resorption of an adjacent erupted tooth caused by the embedded tooth.

(A) Resorption of the embedded tooth. Before describing the process of resorption of the enamel and dentin of a completely embedded tooth, it would seem wise to briefly review the condition existing previous to the eruption of the normal human tooth. In the normal stage of development the enamel is fully formed and calcified. The original layers of the enamel organ have been reduced to several layers of squamous epithelial cells, which surround the entire crown and adhere to the enamel surface, and are known as the enamel epithelium. Covering the enamel epithelium is a thick layer of fibrous connective tissue, the tooth sac or follicle; in the area where the unerupted tooth comes nearest to the surface of the oral mucous membrane, this tooth sac blends intimately with the thick lamina propria of the mucosa.

The condition described above normally persists for a period of two or three years, *i. e.*, the interval between the completion of amelogenesis and the eruption of the tooth. In the case of fully embedded teeth, it persists over an abnormally long period, sometimes over a lifetime. We know that as long as the enamel epithelium remains intact, the enamel, too, will be intact. This explains why many teeth, after having been embedded for thirty or forty years, still have perfectly normal crowns. Occasionally, however, the continuity of the enamel epithelium of an embedded tooth is destroyed.

The causative factor, or factors, result-

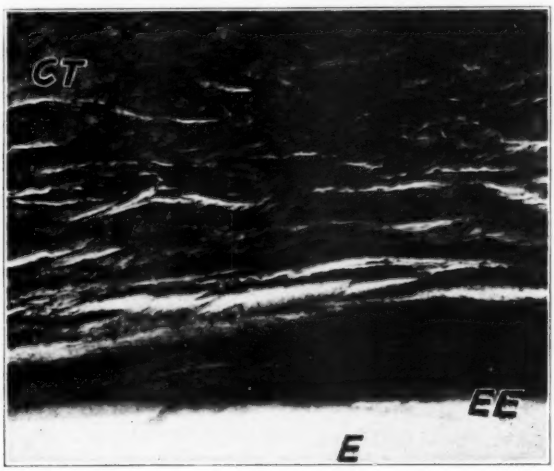

Fig. 10.—Higher magnification of connective tissue and enamel surface in Figure 9: E, Enamel space; EE, enamel epithelium; CT, densely interwoven bundles of connective-tissue fibers without any cellular infiltration.

ing in the loss of the enamel epithelium of the embedded tooth cannot at this time be stated; but, whatever the cause of the destruction of the enamel epithelium, the result will always be the same, as it permits the connective tissue of the tooth follicle to come in contact with the enamel. Then this connective tissue may form cementum and deposit it directly on the intact enamel surface. This was shown by Kotanyi in the case of the embedded upper third molar.

We have seen many extracted specimens of embedded teeth, particularly third molars, in which the cementum extended from the cemento-enamel junction for a considerable distance over the enamel. But this connective tissue covering the enamel can also cause its resorption, which may be very extensive and may destroy a large portion of the crown and also, occasionally, the root of an embedded tooth. This resorptive process of the completely embedded tooth is followed by formation of bone and bone marrow, so that eventually the tooth may be replaced almost completely by cancellous bone.

A clear understanding of these changes is very important for diagnostic purposes. *A fully embedded tooth cannot decay.* Dental caries is a process that is intrinsically dependent upon the presence of saliva and oral microörganisms, which do not have access to a completely embedded tooth. Hence, if the roentgenogram of such a tooth shows such a defect in the dental structure, this defect must be caused by resorption and not by caries. Therefore, it should not be spoken of as "decalcification," or in other more or less vague and meaningless terms, but as "resorption," unless proved otherwise. Thus far, all instances of such defects in fully embedded teeth which were examined histologically at our research laboratory and by many others, showed evidence that resorption and subsequent ingrowth of cancellous bone had occurred.

Fig. 11.—Higher magnification of area 2 in Figure 8. Root, periodontal membrane and bone of embedded molar: D, Dentin; C, cementum deposited in regular, thick layers; PM, thin, atrophic periodontal membrane; B, compact bone.

The etiologic factors that account for some embedded teeth being resorbed to varying degrees and others remaining intact is a problem that needs further investigation; yet we do know that resorption does not take place until the protective enamel epithelium in that particular field has been destroyed and that an infective process has not been found to co-exist.

(B) Resorption of an adjacent erupted tooth caused by the embedded tooth. Under the following specified conditions, the crown of an embedded tooth causes resorption of the root of an adjacent erupted tooth. This is most commonly observed

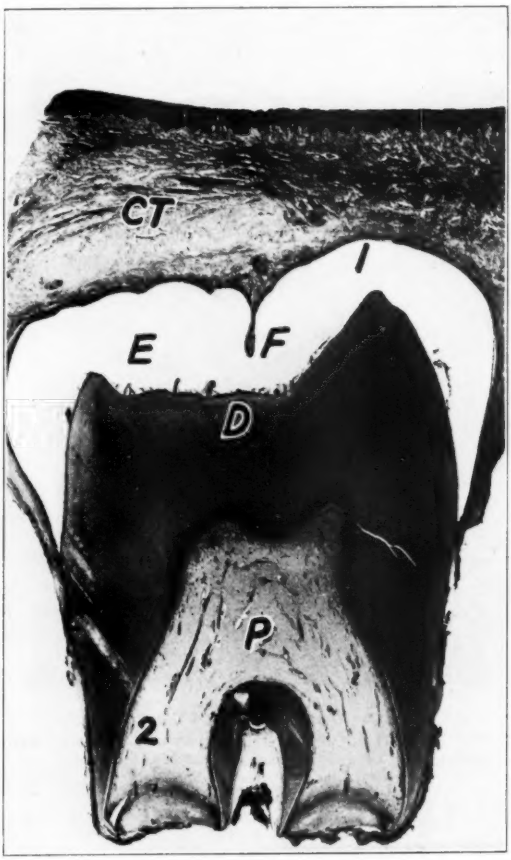

Fig. 12. (Case III).—Completely embedded lower third molar and overlying tissue, obtained by biopsy: CT, Oral mucosa and connective tissue covering crown; E, enamel space; F, enamel fissure; D, dentin; P, pulp. The areas marked 1 and 2 are shown in higher magnification in Figures 13 and 14.

in upper lateral incisors, whose roots may be destroyed by an embedded cuspid, and in second molars, when an embedded third molar impinges upon the distal surface of the second molar. The resorption is caused by the connective tissue intervening between the two teeth, which is stimulated to resorptive activity by the pressure of the moving embedded tooth. Neither the enamel nor the enamel epithelium of the embedded tooth is capable of causing resorption. If for some reason the connective tissue between an embedded tooth and an adjacent root is destroyed, no additional resorption can take place. However, the embedded tooth may continue to exert pressure against the root, causing pain and malposition of the erupted tooth.

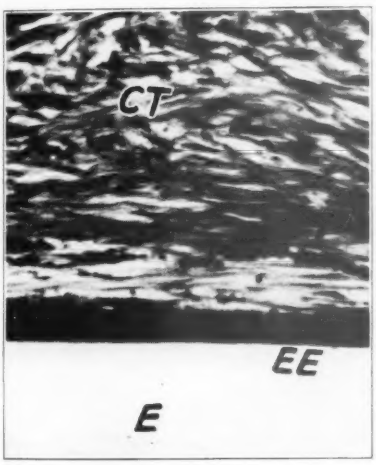

Fig. 13.—High magnification of area 1 in Figure 12. Enamel surface and tooth follicle: E, Enamel space; EE, enamel epithelium; CT, connective tissue bundles without any cellular infiltration.

From a clinical point of view, it is important to remember that such areas of resorption in a root adjacent to an embedded tooth can be expected to be repaired by deposition of cementum as soon as the pressure is relieved, if the involved field has no communication with the oral cavity, and with the further restriction, that the part has not been invaded by an infective process.

Therefore, when a completely embedded tooth which has caused minor root resorption in an adjacent tooth above the gingival attachment is removed, the latter need not be extracted, but great care should be exerted not to injure the resorbed area during the operation, for in all probability the resorption will be repaired after the removal of the embedded tooth.

COMMENT

Dental literature contains several reports dealing with the finding of pathogenic microörganisms associated with embedded teeth. Lucas found bacteria in the surrounding tissues of every completely embedded tooth that he examined. Ito reported similar findings in 80 per cent of the pulps of partially embedded molars.

We have no cultural bacteriologic studies to contribute to this problem, but attention is called to the following fundamental facts, which may help to clarify the discussion.

(1) The terms "presence of microörganisms" and "infection" are not to be regarded as synonymous. The finding of bacteria in a tissue or organ does not necessarily indicate that the organ or tissue is infected. Bacteria are often present in normal tissues without having pathogenic significance; yet they can be recovered by bacteriologic methods and grown on appropriate culture media. *"Infection" is characterized by the actual presence of vascular and cellular reaction of the tissue to the presence of bacteria.* This reaction, known as inflammation, can always be recognized microscopically in sections through the infected tissue. We know

that bacteria are found in a certain percentage of the pulps of extracted intact teeth, but we would not be justified in calling all these pulps infected unless there were present characteristic inflammatory tissue changes.

(2) It is extremely difficult, even when operating under rigid surgical precautions in the oral cavity, to avoid contamination with the ever-present large masses of organisms in the saliva and on the surface of the mucous membrane. Even in the bacteriologic examination of the pulps of intact teeth which were extracted under all possible precautions, a large percentage of them will be found to be contaminated from the outside. In view of this fact, it seems almost impossible to go through the rather complicated operation of removing a completely embedded tooth without contamination by the oral flora. Unless the microörganisms found in this way are definitely proved to originate from the pulp or investing tissues of the embedded tooth, their mere presence is without pathologic significance.

(3) None of the pulps or investing tissues of fully embedded teeth so far reported in literature has shown evidence of inflammatory tissue changes in histologic sections, which leads to only two possible conclusions: Either these tissues were free from microörganisms or, if microörganisms were present, they were not pathogenic to these structures.

We believe that these three facts must constantly be kept in mind when considering fully embedded teeth from a bacteriologic point of view.

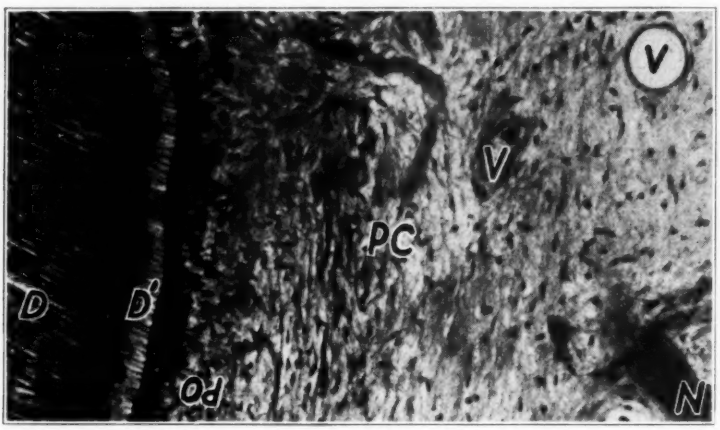

Fig. 14.—Higher magnification of area 2 in Figure 12: D, Dentin; D', predentin; Od, odontoblasts; PC, pulp cells; V, blood vessels; N, pulp nerve.

SUMMARY

(1) Two completely embedded lower third molars and one completely embedded upper third molar were studied histologically *in situ*.

(2) The pulp, periodontal membrane, tooth follicle, bone and overlying oral mucosa are described and illustrated.

(3) No evidence of inflammatory reaction could be found either in the fibrous tissue of the tooth follicles or in the pulps of these teeth.

(4) Bacteriologic stains of the tissue sections revealed the presence of microorganisms on the surfaces of the erupted teeth and in some infected pulpless teeth in the same jaws; yet no bacteria could be found in the pulps and investing tissues of the completely embedded teeth.

(5) The pulp of the embedded upper third molar contained numerous areas of calcification (pulp stones); similar calcifications were found in erupted teeth of the same individual.

(6) From the normal appearance of the tooth follicle and from the total absence of any inflammatory reaction in or around the completely embedded teeth, it appears that such teeth merely represent a continuation of the preëruptive state.

(7) In the light of our present knowledge, the profession should be warned against expecting benefits from the removal of completely embedded teeth in patients suffering from systemic diseases that are held to be influenced or caused by focal infection.

(8) In spite of the foregoing statements and summary of findings, it is held that embedded teeth in radiographically normal structures should be removed when it is thought that they are accountable for or influencing certain neurologic phenomena. In exceptional cases it would appear that one may be justified in removing embedded teeth when all other fields have been freed from focal infection without benefit and it is the belief of the physician in charge that the health of the patient will be improved by such procedure.

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DIAGNOSIS AND TREATMENT OF DEFICIENT MANDIBULAR STRUCTURES IN CHILDREN

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ANY review of the literature of orthodontics reveals the fact that only within recent years has its full potentialities been appreciated. The deeply inculcated idea that the correction of so-called malocclusion of the teeth constituted the problem had become so firmly fixed that scant consideration was given to the supporting structures of the denture and to the fact that their anomalous involvement provides, in numerous instances, the primary deformity. Dental function was established as the basis of both diagnosis and treatment and, upon this incomplete hypothesis, it was assumed that when the tooth problem was solved, a magic key opened the doors to successful treatment.

For years, this plan of treating the denture as an isolated object was the accepted modus operandi, but it received a severe setback when numerous cases failed to terminate successfully under such a formula. With the accumulation of such evidence, thoughtful investigators came to the realization that cuspal function was only one factor, and that the supporting structures of the denture, namely, the maxillae and the mandible with their intricate groups of muscles, and the varied functions of these parts entered into the scheme of things and must receive definite consideration. The fundamental biologic principle that form and function are mutually dependent, in growing processes and in the maintenance of the equilibrium of bodily parts, was demonstrated clinically in no uncertain terms, with the result that definite progress came to orthodontics. Its scope and responsibilities were materially increased, and its entrance into the field of dentofacial orthopedics became a definite reality.

In natural sequence, the etiology of dental and oral anomalies has taken on a new significance, with many things yet to be explained, save on hypothetical grounds. In general, it has become well established that such deformities represent aberrations of growth and function, their character depending largely on the age period, degree of severity and length of time that such pathologic influences have been in existence.

We are now safe in assuming that it does not matter whether the abnormality is manifest by malalinement of individual teeth, by malformation or malrelation of dental arches, or whether the maxilla or mandible, with its adjacent facial structures, is included in the deformity, the problem is the same, the difference being only one of degree; for the growth factor is the consideration of basic importance. It should also be obvious that the term "malocclusion of the teeth," so frequently used to describe the abnormalities encountered, may be inaccurate and inappropriate in describing the objectives of treatment unless its meaning is extended to

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Fig. 1.—Study in oral anomalies showing unreliability of making diagnosis from teeth alone. In the two upper rows the dentures are similar, but there is a vast difference in the manner in which dependent structures are affected. In the lower row, marked mandibular deficiencies are evident, but the molars and bicuspids are in their normal sagittal relationship.

include a far greater range of pathologic entities than the actual words imply.

All anomalies will fall under two general classifications: those designated as "eugnathic," in which the teeth only are involved, and those termed "dysgnathic,"* in which the maxillae or the mandible, or both, are included in the deformity. The latter group is the more serious and so requires the greatest judgment and skill in both diagnosis and treatment. In this group (dysgnathic anomalies) are to be found those cases in which, with other anomalies, there are underdevelopment of the mandibular

Fig. 2.—Labial arch wire with provisions to control frontal and lateral segments of upper dental arch.

structures and, frequently, malrelation of their facial features.

In keeping with the responsibilities arising from our modern concept, orthodontics then has become the science that prevents and corrects dental and oral anomalies. In this rôle, it must consider basically the etiology of such conditions, develop dependable diagnostic methods in order to determine their character and the various conjoining structures involved, and supply methods of therapy that will restore the affected parts to normal form and function.

*Terms suggested by B. E. Lischer.

The problem becomes so diverse and calls for the consideration of so many factors that the responsible clinician is immediately conscious of his limitations. He realizes that success in treatment, particularly in the case of dysgnathic anomalies, will be attained only as the result of long and persistent effort, in which the cooperation of the patient must play an important rôle. In view of the fact that it is frequently difficult to get patients or their parents to regard orthodontic treatment with the same degree of seriousness as other orthopedic operations, an obstacle of real consequence is too often present. When this attitude of the layman, which is also frequently encountered among dentists, can be overcome, we will see our successes appreciably increased in number and their benefits more justly evaluated.

It has generally been assumed that in growth deficiencies of the mandibular structures, a lower posterior dental malrelationship exists. As a matter of fact, this is usually the case, although it is by no means the universal rule. Numerous cases can be produced wherein the opposing first permanent molars and adjacent teeth are in correct anteroposterior relationship, and yet deficient mandibular structures are strongly in evidence. We may also find many persons having mandibular structures falling well within the range of the normal and yet having lower dental retroversions as marked as those associated with mandibular retroversions. (Fig. 1.)

From such evidence, we soon become convinced that diagnosis cannot be carried to the point approaching finality through study of the teeth alone. Any comprehensive plan must differentiate between all the dependent structures of the maxillae and the mandible, with an effort to determine as definitely as possible the number, nature and extent of all parts contributing to the anomaly.

In the diagnosis of deficient mandibular structures in children, it seems that the objective evidence presented by the patient would be sufficient. In other words, when the mandible is so undersized or malrelated that the eye cannot fail to note the condition, a diagnosis is made. Such an appraisal does not meet the prerequisites of treatment. In order to satisfy these, we must know the nature and extent of all contributing anomalies. These, in brief, may involve the teeth, the maxillae and mandible, the oral and facial muscles and the tongue. With the mandible, the deficiency may lie chiefly in the body or in the rami; or both of these dependent parts may contribute in equal degree.

Because of the variability of the problem, all such cases should be carefully recorded by (1) suitable denture reproductions, (2) comprehensive facial reproductions and (3) roentgenograms. Such records are usually considered essential prior to the inauguration of any orthodontic operation, and their importance from a medico-legal standpoint has frequently been emphasized. Their indispensability in obtaining diagnostic information, frequently overlooked in intra-oral and extra-oral examination of the patient, has also been demonstrated. A standardized technic should be used which, in the case of denture reproductions, will show the orientation of the denture to its dependent facial structures, and such supplemental items of value as the angle of the occlusal plane, symmetrical or asymmetrical growth manifestations, the angle of inclination of the teeth and such other information as will render appraisal more accurate. The facial record should be made photostatically in a definite ratio to life-size, and so charted that dependent facial relationships as they exist may be compared with a satisfactory norm pattern.

The question of norm patterns is an important one in orthodontic diagnosis and, in spite of the ever-present factor of variation, is not so difficult as many would have us suppose. We know that in the evolution of the human face and its parts, such as the denture, certain growth patterns have been developed. These vary around an average mean that we call the normal and, in spite of extreme differences, certain essential similarities must be present if the normal is complied with. In appraising the abnormal, therefore, we compare conditions as we find them recorded, with those usually encountered under normal conditions, which gives us the general status of the anomaly. Thereafter, a finer differentiation should be made in determining the needs of treatment by considering each case upon the basis of its individual typal requirements.

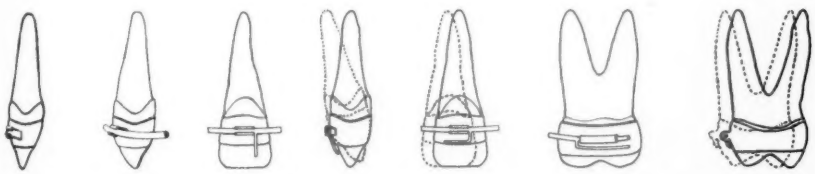

Fig. 3.—Means of controlling individual tooth movements and meeting anchorage requirements with round labial arch wire.

Photostatic facial records are rendered more helpful for purposes of analysis when two planes of the face, as well as a lineal representation of the mandible,

are indicated on them. Such chartings enable us to observe and study more efficiently the points, lines, angles and conformation of the features, and especially the lower half of the face, often referred to as the "changeable area," and discern therein aberrations of growth having a direct bearing on our problem. Such revelations, when checked with the information gained from the denture reproductions, show the correlation of the two factors, and roentgenographic findings, with their evidence of tooth or root development or other intra-osseous conditions, supply supplemental facts indispensable to diagnostic decisions.

The careful clinician will record, in addition, such relevant data as the age of the patient; the teeth and oral forms of the father and mother and other immediate relatives; the status of such oral conditions as the soft tissues; the tongue size; the patient's general health; observations on the nose, the lips and the facial muscles, and any other items of helpful information. In addition, possible etiologic factors should be tabulated, not only as a safeguard during treatment, but also as a means of accumulating facts that, in time, will be valuable in proving or disproving their bearing as causative factors. Such clinical evidence should include any diseases that the patient has been subjected to and that might be regarded as predisposing influences, and also those more immediate suspected determining causes that appear to have specifically given the final impetus toward the present status of the anomaly.

A routine method of analysis that includes all possible conditions related directly or indirectly to a case will soon demonstrate its advantages. To this end, the practitioner should note (1) the occlusion of the teeth; (2) the form and relationship of the opposing dental arches; (3) whether the anomaly extends beyond the immediate area of the teeth or beyond these boundaries and involves the maxillae and the mandible, or both; (4) in the case of the mandible, whether the body or the rami are involved, and, if so, to what extent each contributes; (5) such facts as roentgenograms reveal. In addition, a thorough intra-oral and extra-oral study should be made of the musculature of the face and tongue. In other words, every part of the oral ensemble affected by or contributing to the anomaly should be differentiated.

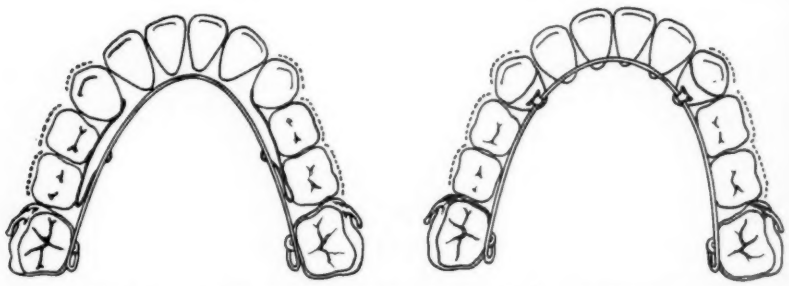

Fig. 4.—Lingual arch wire with auxiliary springs, and with tooth movement advanced to point where anchorage requirements for intermaxillary pressure are provided.

The wide diversity of conditions that such an analysis reveals soon leads one to the conclusion that the only logical method of classifying anomalies consists

in naming them as they occur in each case, and that treatment must be based upon such revelations. We can then select the most effective means of meeting each distinct problem, and these may be applied in logical sequence. The term "means" is here plural, because our therapy may vary decidedly at different stages of treatment; a fact easily understood when we realize the important rôle growth must play, particularly in cases wherein definite mandibular deficiencies are to be overcome. Methods of therapy, in such cases, will include use of the usual

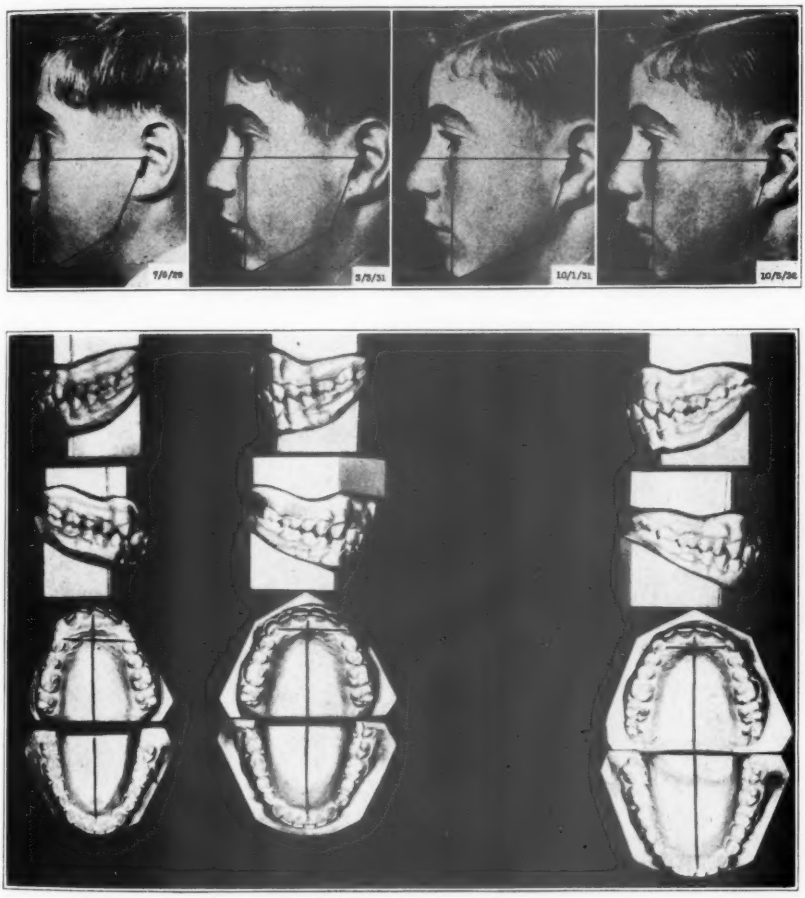

Fig. 5.—Boy, aged 14, whose mandibular function was restricted by marked supraversion of frontal segment of upper teeth. When this condition was overcome, there was immediate growth response throughout the whole organ.

agencies of applied mechanics, those fundamental means of stimulating the growth impulse that are available in myofunctional therapy; the overcoming of nutritional deficiencies; the correction of malfunction in such adjacent structures as the nose and throat; the establishment of correct bodily posture, and such other conditions as may be essential to the progress and permanency of orthodontic operations.

In the selection of an orthodontic mechanism to meet the phase of treatment when such agencies must be employed, we have

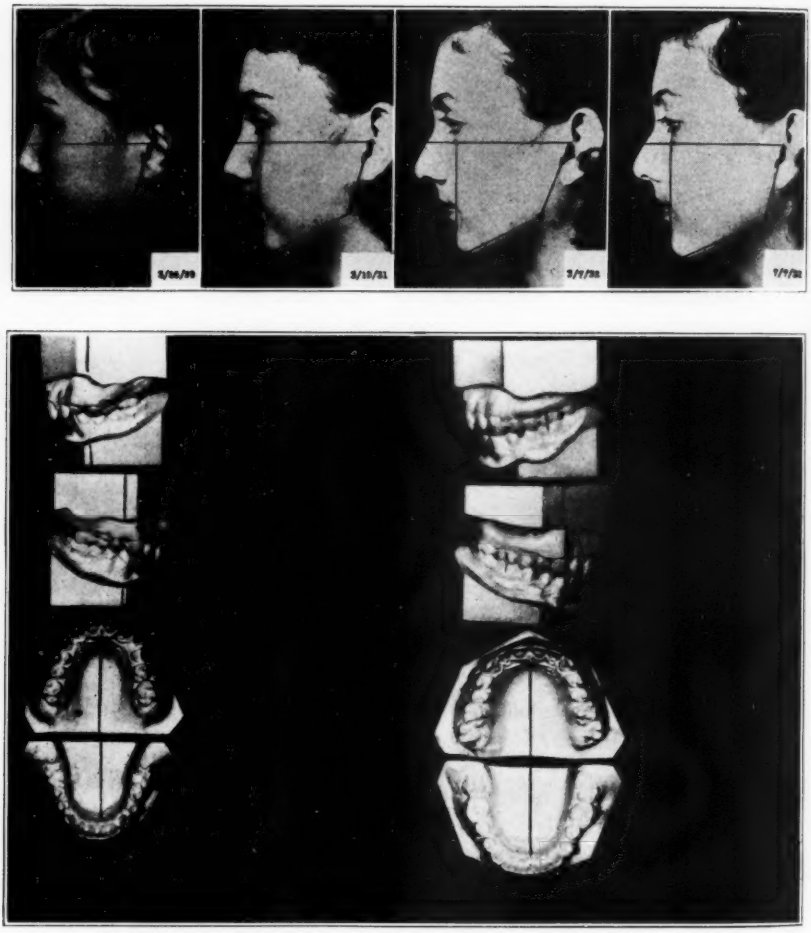

Fig. 6 (Case 1).—Progress of case in girl, aged 10 years and 5 months.

available several proved types. Of these, the labial arch wire, with special control features, will suffice for the maxillary teeth, and the removable lingual arch wire with auxiliaries will prove adequate for the mandibular teeth. Under intelligent operation, these may be utilized to bring about promptly necessary tooth movements, dental arch alterations and the establishment of dento-intermaxillary relations of advantage, and otherwise aid in establishing the teeth and

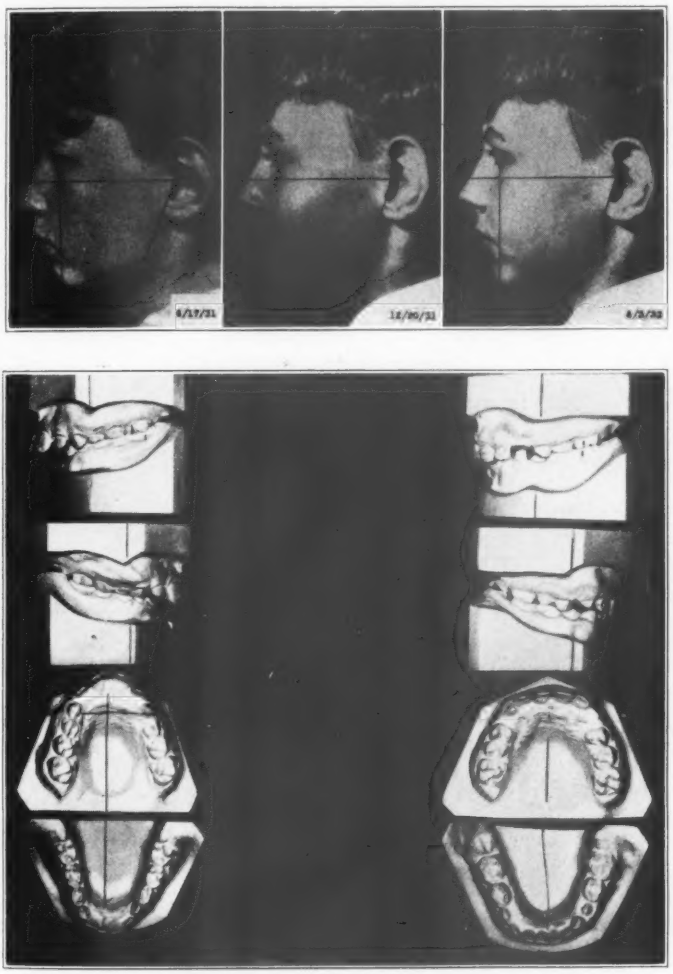

Fig. 7 (Case 2).—Progress of case in boy, aged 9 years.

jaws within the normal functional range.

In employing the labial arch wire, the small-gage flexible type is preferable, for it can be adapted to the teeth regardless of their disarrangement, and, through its gradual modification, advantageous changes are quickly attained. The diversity of anomalous involvements in different cases makes it necessary to vary the control features, but it is believed that the banding of the four incisors is usually necessary. The control of the lateral segments of the dental arch, with the deciduous teeth still in place, may be effectively achieved by providing bands for the first deciduous molars, with lingual spurs

Fig. 8 (Case 3).—Progress of case in boy, aged 12 years.

extending to the adjacent teeth on each side. Through this means, the dental arch may be brought to the desired width, and the horizontal and vertical positions of the incisors controlled, the primary anchorage units being the first permanent molars. Such an arrangement of appliances is illustrated in Figure 2. A round labial arch wire of precious metal alloy 0.030 inch in diameter is advocated, this being secured to the anchor teeth by round buccal tubings, with the medium

Fig. 9 (Case 4).—Progress of case in girl, aged 10 years and 6 months.

of attachment between other banded teeth provided by open-tube attachments. With such provisions, it may be removed, given necessary modifications, replaced and locked into position with ease. The annoyance and time spent in cutting and replacing "tie-wires" are thereby avoided. In older cases, it may be necessary to provide for the direct control of the bicuspids and cuspids when they have erupted, but, in many instances, such extensive banding is not necessary, the plan suggested for their deciduous predecessors proving adequate. In the hands of the skilled clinician, the round arch wire can be used for all tooth movement, be they rotations,

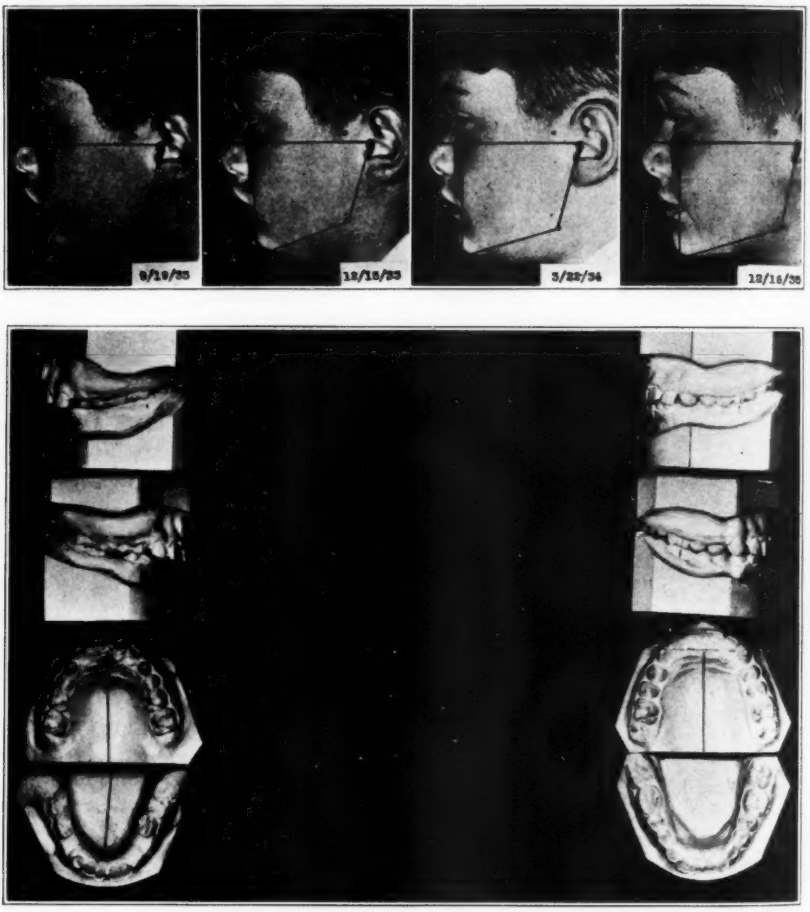

Fig. 10 (Case 5).—Progress of case in boy, aged 9 years and 6 months.

tipping or bodily movements, group movements or other essential changes, the features providing for such varied control being available in band attachments and soldered additions to the arch wire, as shown in Figure 3.

In laying the foundation for treatment, we should endeavor to anticipate all tooth movements and provide the means necessary to accomplish our objective. In such planning, rigid attachments, which completely restrict individual dento-alveolar functional movements, should be avoided, and, in their stead, non-rigid, but controlled, attachments should be employed. These, in conjunction with the round arch wire, which lends itself to accuracy in bending and other changes essential during its adaptation, offer welcome relief to patients in freedom from soreness after adjustments.

Where diagnostic findings show marked intraversions of the lateral segments of the dental arch, with anteversion* of the maxillary incisors, the correction of these anomalies should progress adequately before active measures to place the lower teeth in correct anteroposterior relationship are attempted. If, in addition, the necessity of changing the vertical relationship of the incisors in an upward direction is evident, this also should be advanced to the point where major interference with the adaptation of the mandibular teeth to the maxillary teeth will be eliminated.

Coincidently with the efforts already described in connection with the maxillary teeth, changes should be initiated in the mandibular arch that will eventually perfect its form and render it quickly adaptable to correct dentofunctional relations with the maxillary teeth. For meeting these requirements, the removable lingual arch wire offers particular advantages. Through the employment of auxiliary springs, individual and group tooth movements are effected and, at the same time, adequate anchorage requirements are provided for the application of intermaxillary pressure in those instances where this is essential.

In rendering the lingual arch wire more stable, and to reduce any likelihood of its being displaced by the tongue, bands should be provided for both cuspids, carrying spurs which slightly overlap the arch wire. In addition to their stabilizing effect, these provide some additional anchorage and make it unnecessary for the attachments on the lower anchor teeth to possess a high degree of rigidity. While such attachments should by no means be loose-jointed, a slight mobility within the range of control reduces the difficulty in removing and replacing the arch wire and places less restraint on the anchor teeth, thereby providing greater comfort for the patient. Such an arrangement of appliances is shown in Figure 4.

In the treatment of mandibular growth deficiencies, the operation of appliances is similar in many instances, although treatment objectives may differ in certain respects. In those instances wherein the molars and bicuspids are already in their normal sagittal relations, this important functional factor need not be considered, and the duration of active treatment with fixed appliances may be materially shortened. With such cases, the restoration of more complete mandibular function frequently will open the way for helpful growth changes. This is quite evident in the case shown in Figure 5, in a boy, 14 years old, in which mandibular function was restricted by a marked supraversion of the frontal segment of the upper teeth. When this condition was overcome, there was a prompt growth re-

*The term "intraversion" implies teeth, or groups of teeth, nearer the median plane than normal, *i.e.*, intra—inward, version—position; and anteversion, teeth forward (ante) of their position (version).

sponse throughout the whole organ. This continued during the eruption of the third molars; a fact worthy of remembering in treating cases of this character. We have frequently noted that the eruption of these teeth may be accompanied by helpful growth, especially in a vertical direction.

Regardless of type, with inhibiting influences removed, and under favorable conditions of age, deficient mandibular structures will, under the influences of normal functional habits, tend to complete their growth in harmony with the patient's inheritance. The first step in treatment, therefore, consists in establishing dental function, supplementing this with the growth stimuli resulting from the increased functional action of those muscles related to the deficient structures. The time-worn physiologic axiom that "function and growth go hand in hand" here demonstrates its infallibility, but, when applied, must include all those parts wherein the need for increased functional activity is evident. This plan of therapy is predicated upon Wolff's law of bone transformation, which, in brief, is that the external form and internal structure of bone changes with every alteration of function, or, stated otherwise, the amount of growth in bone depends on the need for it.

Myofunctional therapy, therefore, offers an indispensable opportunity in such cases, and its possibilities are limited only by age and heredity. Under favorable conditions of general health, that is, under optimum metabolic balance, the response to such agencies is more rapid, a fact easily appreciated by any student of the growth problem. The greatest difficulty lies in getting patients, and those responsible for them, to carry out their part in this program. This obstacle does not change the nature of the task or the manner in which it should be approached. It is still a problem in dentofacial orthopedics, and appliances, important as they are, will only do part of the work.

Myofunctional therapy must supplement mechanical treatment, being put into effect after major interferences with normal dental function have been removed. At this point, the guidance and control of such muscular groups as are involved is undertaken, and the patient drilled in their application. The plan is continued until their increased development and strength completes the restoration of the whole organism to full normal status, including the external and internal pterygoids, the temporal and masseter groups, the orbicularis oris and the muscles related to it, the platysma myoides and, last but by no means least, the tongue. No attempt will be made here to give the details of the technic involved in training and developing these groups. This is available in the contributions to our literature made by Alfred P. Rogers, of Boston.[1] Suffice it to say that the principles he has given us constitute one of the great constructive contributions to the science and practice of orthodontics.

The wearing of intermaxillary elastics in itself is a definite help in the matter of muscle training. We have all seen instances wherein the muscles have sought relief from the constant pull of the rubber bands by moving the mandible forward and thereby reducing the tension. Even the limited use of the muscles in this changed relationship, when continued through the periods necessary, favors their adaptation to the altered positions of the dental arches. Doubtless, many clinicians who underestimate the value of myofunctional therapy have, through use

1. Rogers, A. P.: Place of Myofunctional Treatment in Correction of Malocclusion, J. A.D.A., 23:66 (Jan.) 1936. Proc. Am. Soc. Orthodontists, 1918: D. Cosmos, 60:857 (Oct.) 1918.

of this method, unconsciously received its benefits.

In presenting a series of cases for critical study, it will be my object to show, in the form of denture and facial reproductions, much of the important clinical evidence upon which diagnosis was based and, by the same means, the sequelae of treatment. The cases selected are typical of those that any orthodontist meets from day to day, and most of them have been recorded over a sufficient period of years to show the sequence of growth changes. All illustrations have been prepared in a similar manner, showing the facial records and the accompanying denture reproductions in such a relationship that their interdependent status is easily apparent. All have been photographed one-half life size, thereby rendering dependent relationships less confusing than when differing proportionate sizes are used between the two. In keeping with anthropologic custom, the left profile is taken with the median plane of the head parallel to the plate or film. The advantage of this standardized plan becomes obvious when successive pictures of patients are made, and growth changes resulting from treatment are to be recorded.

In treatment procedures, two distinct phases will be referred to; *i.e.*, that concerned with restoring the teeth, dental arches and jaws to normal form and function; and the secondary period, given over to the utilization of all influences and agents necessary to maintain the new relationships, establish normal functional habits, encourage supplemental growth and otherwise bring treatment procedures to the point approaching finality. These periods vary in different persons, as will be evident from the examples cited.

In considering these cases, I shall approach all in a similar manner, subjecting essential parts to analysis. This will include four basic considerations as to diagnosis and treatment: (1) The dental arch width; (2) the anteroposterior relationship of the opposing teeth and jaws; (3) the vertical relation of the denture in the face, and (4) the status of the facial muscles. The denture will be considered in conjunction with its dependent facial structures, for these factors merge universally in the particular anomalies we are considering, so that to separate them is difficult. In all cases reported, the appliances represented by Figures 2, 3 and 4 were used during primary treatment.

REPORT OF CASES

Case 1 (Fig. 6).—A girl, aged 10 years and 5 months, had (1) a bimaxillary alveolar intraversion, mild in degree; (2) a lower bilateral dental, plus a mandibular retroversion,* the body of the mandible being affected more than the rami; (3) supraversion of the upper incisors, medium in degree, and (4) deficiency in tone of facial muscles but with lips in function.

Primary treatment was started March 26, 1929, and dental function established in approximately eight months. Owing to an accident, which rendered the upper incisor teeth quite loose, fixed appliances were left in place until March 10, 1931. At this time, a Hawley appliance was installed on the upper teeth. Previously, the exercise for general facial development was prescribed, and had been faithfully carried out by the patient. The Hawley appliance carried a shelf just lingually from the incisors, and, when worn, it established a correct incisal overlap, but separated the posterior teeth when the jaws were closed. After its installation, the patient was instructed to exercise the temporal and masseter group of muscles. The appliance was worn at night only, except when this particular exercise was taken, and its use was

*The term retroversion implies a backward (retro) position (version) of teeth or their supporting structures, or both, and supraversion, structures too far away from the Frankfort horizontal plane.

continued through a protracted period until the posterior teeth had settled into the functional relationship recorded on March 7, 1932. In the meantime, favorable growth changes in the mandible and throughout the face had become increasingly evident. The status of the face was recorded the last time, July 7, 1932, as a matter of interest.

CASE 2 (Fig. 7).—A boy, aged 9 years, had (1) an upper alveolar intraversion, mild in degree, the right side affected more than the left; (2) an upper incisal anteversion; lower bilateral dental, plus mandibular, retroversion, the anterior portion of the body of the mandible being visibly affected; (3) upper incisal supraversion, medium, and (4) a deficiency in tone of the facial muscles, especially the orbicularis oris.

Primary treatment was started June 17, 1931, and the teeth, dental arches and jaws were placed within the functional range by Dec. 20, 1931. As soon as the teeth approached this status, the exercise for general facial development was prescribed, with visible improvement in the muscles, and an almost immediate growth response in the anterior portion of the mandible. After the recording of the case, June 5, 1932, the fixed appliances were removed and a Hawley appliance was placed on the upper teeth, being worn at night only. This was provided with a lingual shelf to establish correct incisogingival relations, and, in addition to being worn at night, was utilized when exercises for stimulating the temporal and masseter group were put into effect. This was continued until the posterior teeth had assumed a more nearly perfect relationship in the occlusal plane.

CASE 3 (Fig. 8).—A boy, aged 12 years, had (1) a bimaxillary alveolar intraversion, mild in degree; (2) a lower bilateral dental, plus mandibular, retroversion, the body and rami of the mandible being equally affected; (3) an upper incisal supraversion, mild, and (4) an extreme deficiency in tone of the facial muscles.

Primary treatment was started Sept. 11, 1930, and the teeth, dental arches and jaws established in their normal functional relationship by May 4, 1932. Active treatment appliances were removed at this time, and a cuspid-to-cuspid retainer was placed on the lower teeth and a Hawley appliance on the upper teeth. This carried a lingual shelf; which established an improved incisal overlap, but prevented the posterior teeth from contact. The appliance was worn at night, and during those periods when the exercise to stimulate the temporal and masseter group was utilized. At a later period, an additional appliance was made with the shelf raised to a higher point, and this was worn until the molars and bicuspids had assumed the relationship shown in the record of Jan. 3, 1934. In addition to the temporal-masseter group, the exercise for general facial development was given, but this was practised without the appliance. The favorable growth changes in the mandibular structures are evident in the series of facial records extending through a period of nearly four years.

CASE 4 (Fig. 9).—A girl, aged 10 years and 6 months, had (1) a bimaxillary alveolar intraversion, medium in degree, the right side affected more than the left; (2) an upper incisal anteversion and lower incisal retroversion, with molars and bicuspids in correct anteroposterior relationship, and mandibular structures markedly deficient; (3) an upper incisal supraversion and bimaxillary posterior infraversion, the left side affected more than the right, and (4) a deficiency in tone of the facial muscles, with the lips malrelated.

Primary treatment was started June 10, 1928, and dental function established by March 5, 1929. The exercise for general facial development was prescribed, being followed later by that devoted to the pterygoids. By Nov. 15, 1929, all fixed appliances were removed from the upper teeth, and a Hawley appliance was substituted. A removable lingual arch wire was left on the lower teeth. By this time, the habit of mouth breathing had been pretty well overcome and mandibular growth was evident. A shelf was provided on the Hawley appliance; which established a desirable incisogingival overlap, and the exercise of the temporal-masseter group was put into ef-

fect, being continued until the dental relationship indicated by the records made Dec. 12, 1930, had been established. An effort was made to encourage the patient to continue the task of building up the oral and facial muscles and to establish nasal breathing. In furtherance of this, she was instructed to hold a card between her lips during study periods in school. This helped her to become lip conscious, and when she was last seen, the tone of the muscles and the facial appearance were reasonably satisfactory. The changes in the angle of the occlusal plane in this case are a matter of interest.

CASE 5 (Fig. 10).—A boy, aged 9 years and 6 months, had (1) an upper alveolar intraversion of mild degree, the lower dental arch being approximately normal; (2) an upper incisal anteversion and lower bilateral dental plus mandibular retroversion; (3) a supraversion of the upper incisors, mild in degree, and (4) a deficiency in tone of the facial muscles, with the lips malrelated.

Primary treatment started Sept. 19, 1933, and the teeth were promptly established within the normal functional range. Mandibular growth became apparent within three months, as indicated by the facial record made Dec. 15, 1933. The fixed appliances were removed from both the upper and the lower teeth March 22, 1934, a Hawley appliance being worn at night only, from this time forward, on the upper teeth. By this time, mandibular growth had progressed to the point where normal function, between both the teeth and the facial muscles, was possible. As a means of building up the flabby facial muscles, the exercise for general facial development had been put into effect, and, with the installation of a Hawley appliance, the temporal-masseter group exercise was added to this. The appliance, which carried a lingual shelf establishing correct incisal overlap, but depriving the bicuspids and molars of occlusal contact, was worn during this exercise. As the need for additional vertical development in the lateral segments of the dental arches is evident, as shown by the record made Dec. 16, 1935, this plan of treatment is still in effect.

It will be apparent from these case reports that in the treatment of deficiency in mandibular structures in children, the question of supplemental growth assumes supreme importance and the extent to which it is brought about determines the degree of success attained. This will show a variation in different cases, with many factors entering into the problem. Among these, we may list heredity, the favorable age for growth response, the state of the health and, last but by no means least, the matter of faithful cooperation on the part of the patient. The benefits that successful treatment confers are of such nature that any amount of effort or time spent would seem to be justified. In view of this fact, it is difficult to reconcile the indifferent attitude of certain parents toward the problem and their willingness to place such care in a position secondary to many trivial things in life. From the standpoint of appearance alone, the classification of such deformities as major orthopedic problems would be justified. When we add to this the matter of impaired dental and oral function, with their effect on the general health, the importance of treatment is multiplied. Perhaps we shall yet see the day when our efforts in this verdant field are more fully appreciated and children in increasing numbers will find relief from such afflictions.

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SOME VITAL PROBLEMS IN COMPLETE DENTURE CONSTRUCTION

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THE science of dentistry as we know it today may be traced through two distinct developmental periods. The first one was a mechanical period, which ended with the appearance of William Hunter's paper on "Oral Sepsis" (*London Lancet,* Jan. 14, 1911). Since 1911 and up to the present time, there has existed the second division in the developmental life of dentistry, which may be termed the "biomechanical period." In the first, or mechanical, period, we find current dental literature, textbooks, college curriculums and dental society programs were made up almost wholly of methods and technics which dealt with the mechanical side of dental therapy. In comparison with today, there was a certain contempt for the biologic fundamentals, and only the brave ever attempted to inject anything but mechanical thought into a dental subject under consideration.

Naturally, as would be expected, the reaction of the dental profession to Hunter's exposures was largely negative. There followed a few years of bewilderment in dental thinking. Society meetings were turned into debating societies, and many controversial articles appeared in the dental journals.

Probably much good can be traced to this epoch. It promoted clear thinking on the part of the better dental minds of that day. As years went by, there arose out of this chaos a consciousness on the part of the dental profession that there existed a direct relationship between the dental system and the rest of the body.

Dental thought slowly changed from that which had to do with the mere mechanics of reparative and restorative dentistry to a consideration of the influence these mechanical procedures might have on the life and health of the patient.

Looking back over this period from 1911, we see that dentistry has been revolutionized. This came about as the various branches of dentistry reorganized to meet the biologic requirements of this new and modern dentistry.

It is regrettable, and somewhat puzzling, that complete denture construction did not keep pace in the matter of readjustment during these years since 1911. While the other branches of dentistry were housecleaning and making biologic adjustments, complete denture prosthesis was being exploited. The grandest array of glorified technics and methods of procedure ever known to dental history was produced. Practically none of these had a biologic foundation. Even though great claims of perfection were made by the proud originators, we hear little today of either the men or their prosthetic systems.

The reason that the efforts of these men have not lived is that their technics were built on an attempt to standardize

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a procedure that could be used universally on edentulous patients.

Another fact which has had a tendency to retard straight thinking has been the continued effort, on the part of certain powerful commercial agencies, to flood the dental profession with stenciled prosthetic nonsense. This literature dealt with technics advocating a universal type of treatment for all edentulous patients. During the early years following 1911, the educational efforts of commercial houses did some good, but, in these later years, with our better knowledge of the biologic requirements of our patients, and a recognized need for a diversified treatment in rendering dental service to the edentulous, these persistent efforts to mold and direct dental prosthetic thought, and to keep alive a standardized universal technic of complete denture construction, have been factors in keeping the dental profession satisfied with methods that are obsolete. So powerful has been this influence that it has made dentists timid about reporting new and scientific methods of incorporating biologic thought into the conduct of a prosthetic practice.

When we attempt complete denture construction, it is important to remember that we are not dealing with a static problem. The very fact that we make dentures to aid in restoring function and that these dentures are to rest on living and changing tissues means that our problem is biomechanical. During the function of mastication, stress is produced. The production of stress gives rise to the problem of its proper distribution over the denture bases. This phase of denture construction is often termed denture loading.

While it is not my object to present any elaborate technic for the construction of complete dentures, it should be noted that the problems to be discussed are among those commonly met with in any type of prosthetic practice. If any of the points have merit, they can be incorporated into your present complete denture technic without any material change.

Any method of treatment of the edentulous patient that is intended to have universal application in all types of cases is certain to result, in many cases, in failure. We may, and often do, standardize our methods of procedure, but the operator who is ever alert will vary his approach to complete denture construction according to the complications that are present in the individual case.

Whether mouth conditions are favorable or unfavorable for complete dentures, certain bio-engineering factors must be considered in each individual case. Among these are the proper distribution of the stress of mastication, the control of the vertical dimension or intermaxillary space, the utilization of all applied leverages for retentive purposes and, in addition, other more or less abstract factors, such as patient education and management, case planning and esthetic considerations, all of which are important in the construction of complete dentures.

PATIENT EDUCATION AND PATIENT MANAGEMENT

Patient education must be a preliminary to any work to be attempted. Patient management has to do with the control of the patient after work is begun and during the construction of the dentures. It also covers the instructions given at the time of inserting the dentures and during the adjustment period following insertion.

No system of patient education and patient management will be completely successful. No matter how carefully these important phases of denture construction are undertaken, there will always be those

who are able to misunderstand one's best efforts to acquaint them with what lies ahead.

It is possible to minimize all types of misunderstanding by having a definite plan for handling prosthetic patients.

All classes of denture patients must be educated and managed, but the approach to this matter must vary with the type of person being treated and the dental environment.

To most people, the loss of teeth is a calamity. If we imagine ourselves in the patient's place, we can, no doubt, approach the task at hand with sympathetic understanding, which is one of a dentist's most important attributes.

The dentist must avoid a seeming indifference, always appearing to take a personal interest in the patient's condition.

As patients have no dental background, we should never try to explain their oral condition to them in technical terms.

Practically all patients have little or no knowledge of prosthetic dentistry. What knowledge they may have is based on fillings, crowns, extractions, etc. Whatever prosthetic knowledge they possess has usually been gained from conversation with others.

When made to understand in advance just what can be expected of complete dentures, patients, as a rule, will accept the conditions gracefully. When the educational talk is left until after insertion of the dentures, or if our explanation of the problems involved is not understood, we generally have dissatisfied patients. It is impossible, after the dentures are inserted, to inspire further confidence, and any attempt on the part of the operator to explain conditions, no matter how tactfully done, is usually interpreted as an effort to cover over imaginary shortcomings in the dentures.

In order to get material for an educational talk, it is a good plan to let the patients talk first. Thus, we learn of their past dental experiences and their reactions. It also becomes evident in what esteem they hold dentists who have rendered them service in the past.

While the patients are talking, their mental attitude is studied and the dentist finds out whether they really wish to have dentures. Patients who are having dentures constructed because some friend or relative insists are seldom easy to manage.

If fear or doubt as to their ability to use dentures exists, the dentist must try to learn the reasons and must attempt to dispel this anxiety on the patients' part in his educational talk.

Many patients who really need complete denture service come to the office intent on having their remaining teeth repaired. This situation presents a somewhat different problem, and the educational talk must direct their attention to the exact condition of their mouths.

We must try to create in these patients an interest in their oral condition. Finally, we must try to lead them to desire complete denture service.

It usually takes some time to convince them that only complete dentures are indicated in their cases. The conversation must not be allowed to drift to other topics.

It is difficult to obtain from the nontalkative and unresponsive patient information for an educational talk. This information must be collected through direct questions thought out in advance. These questions should be logical and direct to the point.

By this method of procedure, it should be possible to gather ample material for an effective educational talk on the specific dental needs of our patients. The dentist should decide on a few points that are related to the existing oral conditions and, in simple understandable language, talk over the individual dental problems,

always keeping in mind the fact that patients do not understand highly technical explanations, nor are they familiar with dental terms. Such topics as facial appearance, general health, mastication and the need for roentgen-ray examination should be discussed in a general way. Too much time should not be spent on this general discussion. As soon as possible, the dentist should be more specific in his remarks, choosing points that are directly related to the case, such as the condition of the ridges and gums, the facial appearance and shortening or atrophy of the lip. When dealing with patients who have short lips, we may stop suddenly as if having made an important discovery and, in a mildly alarming manner, call the patient's attention to the lip condition, suggesting exercise and massage. The purpose of this type of approach is to establish firmly in the patient's mind the short lip condition. This may serve to obtain better cooperation from the patient during that period when attention is being given to esthetics—a later step in the construction of the dentures.

Sometimes, we find it of value to make impressions of the edentulous ridges and any remaining natural teeth, deferring the educational talk until study casts are available; at which time, comparisons can be made with other casts wherein ridge conditions and ridge relations are more favorable.

The use of various prosthetic pieces has been omitted from this educational talk because they should not be employed, if at all, until we have firmly established in the patient's mind the idea that it is a health service we are rendering and not a sale of so much merchandise. When we sell dental merchandise to the patients instead of attempting to interest them in a health service, we lose an opportunity to put prosthetic dentistry on a higher plane.

After the educational talk has been delivered, we may indulge in a little research work that will be interesting and instructive. By a few simple questions, we can find out to what extent our patients have understood the explanation of their individual problems. From the answers, or from failure to answer, how little the patient has understood the educational talk becomes evident.

To remedy this condition, simpler language is employed, covering fewer points, with each point more forcefully discussed.

The need for maintenance and repairs after the dentures are inserted must be mentioned without fail. People have been educated to expect that maintenance will be necessary on the auto, radio, washing machine and, in fact, everything they own, except dentures. They will assume this responsibility provided it is discussed with them at the proper time and in the proper light.

The only time to have an understanding with patients about the variables in their own cases, and other matters, such as the responsibility for maintenance and repairs and fees, is before any work is attempted. At no other time can this be done gracefully.

We are all aware of the great educational power of advertising. Much of the knowledge that we have gained on various subjects and commodities comes to us directly or indirectly through this powerful agency. We are aware that direct dental advertising is both unlawful and unethical. Therefore, we cannot raise the standard of prosthetic dentistry by any form of direct advertising. Individual patient education offers an excellent opportunity to arouse a desire for improved prosthetic service.

Are you willing to do your part or must we continue to fall behind other branches of dentistry in the matter of improvement and progress?

MOUTH PREPARATION

Adequate pre-extraction records should be made, if there is anything in the mouth that will be of future assistance, such as the shade, size and type of the teeth, the shape of the arches and the individual arrangement of teeth in the arches. Sometimes, labial record casts will give sufficient data, and again the operator may wish to make casts of the entire arch.

There should be insistence on a complete roentgen-ray examination, even though all the teeth have apparently been extracted. I make full mouth roentgenograms for every patient for whom complete dentures are to be constructed. The number of cysts, unerupted and impacted teeth, supernumerary teeth, root fragments, areas of infection and foreign bodies found is convincing evidence that this practice is sound.

The ridges are examined to determine whether any surgical procedure is needed. Alveolectomy should be performed if it will improve ridge relations in any part of the mouth. It may be necessary to reduce tuberosities, elevate a frenum or reshape a portion of the ridge. Unnecessary operations should unquestionably be avoided, but proper mouth preparation will often bring success in complete denture construction where failure would have been certain without surgical preparation.

For the purpose of studying the biomechanical and esthetic problems that arise in complete denture construction, it will be convenient to divide the denture into two segments: one, the anterior segment, comprising the twelve anterior teeth; the other, the posterior segment, made up of the bicuspids and molars.

The denture is divided into two segments because the management of each calls for a distinctly different type of consideration. The anterior segment, while regarded largely from the point of view of esthetics, must also be considered from the standpoint of tooth arrangement, so that, during mandibular movement, the dentures will not be dislodged because of excessive overbite. The posterior segment is that area of the dentures over which, at all times and under all conditions, every applied stress must be properly spread. When viewed purely from a dental standpoint, the posterior segment becomes the more important of the two.

The patients will often consider the matter of esthetics as of prime importance. The dentist is fully aware of this fact, but he also knows that if the mechanical principles of his dentures are out of harmony with the engineering principles involved, the patient will receive little benefit or comfort while attempting to use them.

While making the survey of the mouth prior to starting construction of the denture, we should observe mouth conditions which might complicate the matter of correctly distributing stress over the posterior segment during mastication; for whether the mouth conditions are favorable or unfavorable, the proper stress distribution becomes a most important issue, if this vital force is to be utilized in stabilizing the dentures while in use. Every step in the construction of a set of complete dentures should be subordinated to this purpose.

BIOMECHANICS

We cannot approach the biomechanical phase of complete denture construction without giving some consideration to mandibular movements. All of the motive power generated in the dental system arises from the muscles attached to the mandible. During function, the mandible is constantly assuming new and varied positional relationships to the maxillae, which are stationary.

The mandible has been likened to a

swing, owing to the fact that this member is suspended from the cranium by several pairs of muscles and ligaments. The movements of the mandible, like the movements of a swing, describe a series of arcs. The fact that the condyles in the edentulous remain as the only contact point with the cranium, may affect, but does not change, the arcing character of the mandibular movement. During mastication, varying degrees of stress are produced.

When we think of the proper distribution of the stress of mastication, it is well to remember that artificial dentures are constructed on two solid bases, one maxillary and the other mandibular.

This means that any force improperly directed, even to the interference of a single tooth, will affect both dentures. Care in arranging the artificial teeth on these two solid bases, so that the occlusal surfaces have proper curvature which will permit them to remain complimentary to each other, is essential to resist and absorb the stress that may be applied. One of the greatest faults in complete denture construction lies in the fact that we do not constantly think of our problems in terms of motion.

The teeth in the maxillary denture must be correctly arranged in relation to the ridges, so that the occlusal surfaces exhibit an anterior-posterior and a lateral convex curvature. The teeth in the mandibular denture are so arranged that the occlusal surfaces are concentric and present an anterior-posterior and a lateral concave curvature. This type of tooth arrangement, known as balanced occlusion, permits a proper distribution of the stresses, no matter what functional position the mandible may be in at the time the stresses are applied to the teeth.

There is another phase of balanced occlusion in complete denture construction that must be more clearly understood. It is not enough to think of balanced occlusion while teeth are in actual occlusal contact. If they are to remain stable, the dentures must be in a state of balance during the initial mastication of the bolus, before the teeth come in actual contact. This is accomplished by constricting the arches in the molar region until the first and second mandibular molars are inside the center of the ridge, making it impossible to dislodge the dentures when functional stress is applied, even though the teeth are not in actual contact. As the bolus becomes semifluid, the teeth are brought into actual occlusal contact. Balanced occlusion now allows for a completion of mastication without dislodging the dentures.

One other biomechanical factor must be considered in constructing artificial dentures, and that is the matter of vertical dimension, or intermaxillary space. This is very important because it influences in a varying degree every artificial denture made. The choice of treatment in a given case should depend on our ability to control, or maintain, the original vertical dimension after the dentures are inserted. In making the preliminary mouth survey, we should direct our first observation toward any mouth conditions that will interfere with maintaining vertical dimension. The reason for this lies in the fact that, with each degree of loss of intermaxillary space, there is a corresponding loss or change of the original centric occlusion. Therefore, in those cases wherein the vertical dimension cannot be kept constant, it will be impossible to keep the original centric occlusion. This is an important point to remember in building dentures. In fact, it is important enough to warrant further consideration.

There exists in every complete denture case the biologic factor of resiliency, which, during mastication, allows a cer-

tain degree of tissue compression. We know that this compression varies with the amount of pressure applied to the bolus. It is readily seen that, during mastication, a variable is operating which constantly changes the vertical relation of the mandible to the maxillae. Since this is known to be a fact, it may be said without fear of denial that even though it is possible in theory to establish a correct centric relation and build dentures to a correct occlusion, it will never be possible, once the dentures are put in function, to maintain perfectly the original centric occlusion.

While this statement may seem to be negative and discouraging from the standpoint of complete denture construction, we need not be alarmed; for, in our more favorable cases, those in which tissue resiliency is not very great, we can make satisfactory complete dentures without fear of losing the established centric occlusion when the masticating stress is applied.

Parks and others have definitely proved that when dentures are inserted on ridges that will be resorbed, as after recent extractions, or on ridges over which there is a covering of thick, resilient mucosa, the original vertical dimension will be lost and, with this loss, there will be an arcing forward of the mandible.

This forward arcing of the mandible is not to be confused with the functional protrusive movements.

In the protrusive movements of the mandible, the condyles move forward in the glenoid fossae. In the arcing forward due to closure, the condyles become an axis and remain at all times in contact with the posterior wall of the glenoid fossae.

Centric occlusion, even though correct at the time the dentures are constructed, will remain correct only so long as the original vertical dimension remains constant. We have learned the importance of correct centric occlusion in full denture construction, but have we all learned the importance of maintaining correct centric occlusion after the dentures are inserted? From a purely mechanical point of view, in using cusp posterior teeth the results will be about the same, whether we build dentures with incorrect centric occlusion or this condition arises after the dentures are inserted. We are told by authorities that if centric occlusion is off as much as 0.5 mm., during mastication the closure will not be of cusps into fossae and grooves, but of one inclined plane on another, and that the dentures will be compelled to slide until the cusps settle into correct interdigitation. The use of dentures made with cusp teeth when the centric occlusion is, from any cause, incorrect gives rise to horizontal forces which tend to dislodge the dentures and accelerate resorption of the ridges. In those cases, if the vertical dimensions and the correct centric occlusion cannot be maintained after insertion, mechanical cuspless teeth can be employed in order to build a compensating occlusion that anticipates relational changes between the dentures.

To understand the importance of vertical dimension is not only an aid in solving many of the biomechanical problems involved in complete denture construction, but also serves as a basis for a proper approach to the study of esthetics.

ESTHETICS

We commonly think of esthetics as a science which has to do with the artistic side of denture construction. This is no doubt true, but in order to obtain maximum efficiency of the dentures, it is necessary that the operator understand the relationship that esthetics bears to the mechanical phases. These two dental factors must be correlated.

The esthetic zone is that portion of the dentures which becomes exposed during the various functional movements. This definition quite clearly outlines the field to which the art phase of denture construction is limited.

The practical application of esthetics is not a problem that only a genius can solve. Study shows that certain fundamental rules govern the matter of esthetics, just as they govern other steps in denture construction. The first fundamental rule is that we must start with a sufficient amount of vertical dimension to make patients look natural at a definite age.

Proper tooth form and size are important, as is also tooth color, but these are of secondary importance in comparison with the matter of determining the correct vertical dimension.

The proper management of the anterior overbite and anterior overjet may be said to be the second important fundamental of esthetics.

We as dentists are primarily interested in mechanics, but we must remember that patients generally are more concerned with appearance. So, in order to make the necessary compromise in any given case, we must learn to modify the esthetic requirements to fit the mechanical needs.

In considering the mouth survey, mention was made of preextraction records. If these records were made, the operator will have a knowledge of the shade, size and type of tooth that will be correct, and, in many cases, he may have a knowledge of the arch shape and individual tooth arrangement. Building dentures with these records available as a guide to esthetic values is termed imitative dental art.

Where no opportunity was presented for obtaining records before extraction, the operator uses his creative ability in working out the esthetic problems. This is termed creative dental art. Because this is a more difficult matter, our studies will be directed toward this phase of esthetics.

To select teeth of proper size and form, one can follow with satisfaction the rules laid down by J. Leon Williams, with which we are all familiar. Extreme care must be observed not to select teeth that are too small.

More difficulty will be experienced in selecting the proper shades. This will be done by selecting shades that harmonize with the patient's complexion.

We can expect yellow and gray to predominate in complexions. In some cases, it is extremely difficult to determine which color blends most harmoniously with the complexion.

When the operator has a difficult color problem to solve, it may be a good plan to set up on the maxillary occlusal rim a central incisor, lateral incisor and cuspid of a yellow hue, and on the opposite side a central incisor, lateral incisor and cuspid of a gray hue. If we follow this procedure, it will be an easy matter to determine which color harmonizes with the patient's complexion. In his test, the three teeth that will attract the eye first will be the ones that do not blend with the pigment of the skin.

Dark teeth have a tendency to appear smaller in the mouth, while teeth that are too light will always give the appearance of being larger. The reason natural teeth, no matter how large, never look too big is that the color blends with the complexion.

The type of face form, square, tapering or ovoid, with the arch form of the edentulous ridges, serves as a means of determining the correct type of arrangement of the teeth.

In obtaining an esthetic effect, it is more important to make a correct typal

arrangement than it is to use a correct type of tooth.

Changing the tooth arrangement to fit the facial type will have much to do with overcoming the typical false-tooth appearance so common in denture patients.

We often have the false-tooth appearance in the finished dentures because the central incisor region is too flat. The incisors should be more prominent. The lateral incisors should be depressed, and the arch in the cuspid and bicuspid region should be narrower. The bicuspid region furnishes the background for the anterior teeth. When dentures are made with the bicuspid region too wide, the anterior teeth are not properly set off.

When the arch is wide in the bicuspid region, artificial dentures appear to be all teeth, even though the operator has used small teeth in making the dentures. A slight exception in the matter of arranging bicuspids will be found in the ovoid types. Here, we find the bicuspid background slightly wider. In the ovoid type, there is a tendency for the arches to increase in width until the second bicuspid is reached. This wider bicuspid background will be in harmony with the anterior ovoid arrangement.

Wide edentulous ridges suggest a fairly even arrangement of teeth, while a narrow ridge is always suggestive of crowding and a general constriction of the arch. Especially is this true of the narrow mandibular ridge.

It is in connection with these narrow types of arches that we must employ irregularity when arranging the teeth, in order to assure esthetic effects. Owing to the fact that the effect is somewhat subdued in the mouth, the irregularities must be somewhat exaggerated on the articulator to assure a natural appearance after the dentures are inserted.

Irregularity of the incisors in natural dental arches often indicates that the teeth are in a definite position in relation to the incisal plane. This is noted especially when the anterior teeth are in function and subject to abrasion. Maxillary incisors, if they are prominent in the arch, are longer. In the mandible, the reverse is true, incisors that are in a prominent position in the arch being shorter.

Pleasing effects can be produced in arranging anterior teeth irregularly or crowding them in the maxillary denture, when the central incisors, if prominent in the arch, are set to appear longer in relation to the incisal plane and the maxillary lateral incisors, if depressed in the arch, are set to appear shorter.

On the mandibular denture, we employ the reverse, the central incisors, if placed prominently in the arch, being made shorter in relation to the incisal plane, and the mandibular lateral incisors, if depressed in the arch, being made longer.

This scheme used by nature in arranging incisors irregularly is not only a helpful guide in setting up teeth for complete dentures, but is equally useful in the arrangement of incisors in anterior bridgework.

The same rule applies to the incisal edges of single teeth that must be rotated. In the maxillary arch, a central or lateral incisor that is rotated distally toward the lingual aspect must have the incisal edge ground so that the distal incisal angle is shorter, or vice versa, if it is rotated mesially toward the lingual aspect. In the mandibular arch, a central or lateral incisor that is rotated distally toward the lingual aspect should be ground on the incisal edge so as to be longer at the distal incisal angle; and vice versa, when the lower incisors are rotated mesially toward the lingual aspect. In those cases wherein the anterior teeth are end to end, this rule governing the incisal lengths of irregular teeth must of

necessity be greatly modified, because of the more or less even abrasion found on the incisal edges.

Because the lower cuspids erupt after the lower lateral incisors and lower first bicuspids, there often will be insufficient room in these constricted arches for the teeth to assume the correct position in the arch. Under these circumstances, the lower cuspids are often below the occlusal plane. Artificial lower cuspids in narrow arches can be similarly placed to produce an harmonious effect.

In arranging the teeth during complete denture construction, it is well to remember that the most pleasing effect, as well as the greatest mechanical efficiency, of the denture is obtained by placing the artificial teeth in the same relative posisions once occupied by the natural teeth.

This naturally brings us to a consideration of anterior overbite and anterior overjet. From an esthetic standpoint, overjet in complete denture construction is more important than is overbite. We rarely, if ever, see patients whose teeth are in contact, unless they are asked to close in centric occlusion. Patients, when not masticating, relax the mandible to a rest position, completely obliterating the vertical overbite. No matter how great the actual overbite may be, what we really see is only the amount of horizontal overjet that is present.

For esthetic purposes, it makes little difference whether we employ overbite in complete denture construction. It will not be seen if we do use it, unless we ask the patient to close the dentures in centric occlusion. If it is indicated, we must use overjet in order to meet the individual esthetic requirements. While it is possible to use anterior overjet alone, without using anterior overbite, from an engineering standpoint anterior overbite should never be used except in combination with anterior overjet.

When the mandible moves laterally to the right or to the left from the centric position, the path of travel is forward and laterally. The forward component in lateral mandibular movement begins the instant the mandible is put in motion during mastication, and continues until the masticating excursion is complete. When using overbite alone, we produce a locked type of anterior tooth arrangement. In employing the "lock-in type" of overbite, the lower anterior teeth, during mastication, immediately come in direct contact with the lingual surfaces of the upper anterior teeth. Naturally, there are produced forces which tend to dislodge one or both dentures, and to produce trauma, which is transmitted to the supporting anterior ridges. The patients, if they can use dentures with a locked-in anterior tooth arrangement at all, will be limited to an open and shut movement only. Properly used in combination, anterior vertical overbite and anterior horizontal overjet prevent the anterior teeth from coming in direct contact during function and allow all the stress of mastication to be directed to the posterior segment of the dentures.

The purpose of anterior overjet seems to be greatly misunderstood, and the amount to be used in any given case seems to be a problem to a great many operators. In the natural denture, the amount of anterior overjet found is always governed by the anterior ridge relations. In other words, if the mandible is underdeveloped, the anterior overjet will be great. On the other hand, if the natural anterior teeth are end-to-end when in centric occlusion, there will be no overjet. The same rule should govern the amount of anterior overjet used in the arrangement of artificial anterior teeth.

We have become so accustomed to using sets of artificial teeth that are man-

ufactured with the linear dimension of the upper set of teeth in a fixed ratio to the lower set, that we fail to weigh the engineering or esthetic value of the overjet. The artificial sets in combination are carved without proportioning the linear dimension of each combined set so as to provide for any anterior overjet.

In setting up the anterior upper and lower teeth in combination, it is a mistake to have the width in the cuspid region nearly the same in both arches. This gives an unnatural effect. To correct this, the width of the upper denture from cuspid to cuspid should be several millimeters greater than the cuspid to cuspid width in the lower. The ratio of differences in width between the upper cuspids and the lower cuspids will vary according to the overjet. With little or no overjet, the difference will be slight; with a large overjet, as found when the mandible is underdeveloped and constricted, the difference in width between the upper and lower in the cuspid region will be greater.

In concluding this presentation of some of the vital problems in complete denture construction, many equally important points have been left out. If any of the points that have been considered contain anything of value, it will be a simple matter to incorporate them in any complete denture procedure.

4317 Kensington Avenue.

MULTIPLE DENTIGEROUS CYSTS: REPORT OF CASE

By PAUL H. BENNETT, D.D.S., Tucson, Ariz.

History.—A white woman, aged 23, referred to my office by a dentist in March, 1934, complained chiefly of pain in the right maxilla centering around the canine fossa, the condition having existed approximately one week. No information as to previous attacks or dental trouble could be obtained. The past history was essentially negative, with the exception of the diseases common to childhood. The patient had been employed as a housemaid since the age of 17 or 18.

Fig. 1.—Impacted upper right cuspid with dentigerous cyst around crown of tooth.

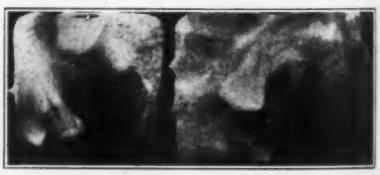

Fig. 2.—Impacted upper left cuspid with dentigerous cyst. The crown of the tooth is distally inclined.

Examination.—Clinical examination revealed slight swelling of the face in the region of the right maxilla, with a fistula draining at the mucobuccal fold opposite the cuspid region, through which a silver probe could be passed to some depth. It was noted that the following teeth were

(Read at the Eighteenth Annual Meeting of the American Society of Oral Surgeons and Exodontists, San Francisco, Calif., July 11, 1936.)

missing (with no history of extractions): the upper cuspids and third molars and the lower left central incisor, cuspid and first and third molars. The lower teeth were very irregular, with particular reference to remaining incisors and bicuspids. There was an extreme Class III relationship of both teeth and jaws. The entire face appeared out of proportion to the remainder of the bones.

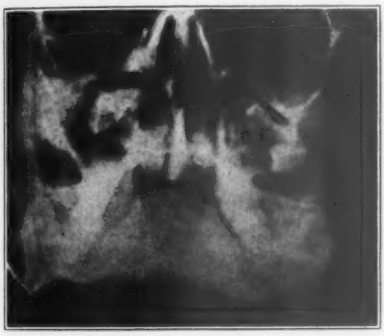

Fig. 3.—Anterior-posterior view of maxillary sinuses, showing molar tooth and cyst in right sinus.

Both upper cuspids were impacted, with evidence of a cyst around the crown of each. The left was unusually deep, with a distal inclination of the crown. An anterior-posterior view of the maxillary sinuses revealed a fully developed molar within the right antrum.

The sinus was injected with lipiodol and another exposure made, which revealed the fact that the entire sinus was filled with a cyst. Both intra-oral and extra-oral

Fig. 4.—Anterior-posterior view of maxillary sinuses after lipiodol injection, showing size of cyst.

Fig. 5.—Intra-oral films of mandible, showing involvement of lower jaw. The impacted incisor cannot be seen in these films.

The buccal and labial plate of bone on both sides of the mandible varied in their convexity, with a marked distention of the cortical plate in the bicuspid and molar region. On palpation, there was a marked fluctuation and a crackling sensation was noted.

A series of intra-oral and extra-oral roentgenograms revealed the following: roentgenograms of the mandible revealed a large dentigerous cyst, with almost complete destruction of the bone, extending from the second molar on the right, around through the symphysis, to the first molar on the left. There was an impacted incisor in the region of the symphysis near the inferior border of the mandible. Normal bone was shown in the first and second

molar areas. The left third molar was unerupted, and another separate and distinct cyst involved the angle of the jaw and half of the ascending ramus. To date, the patient had been unaware of any trouble in the lower jaw, as there had been no discomfort. A complete physical examination was made by a physician, including Wassermann, Kahn and Kolmer tests, urinalysis and a differential blood count, all of which were essentially negative, with the exception of a slight increase in the leukocyte count. Owing to the fact that this was a charity case and the patient could not obtain hospitalization at this time, no further treatment could be rendered other than to reduce the acute symptoms in the right upper cuspid area. In August, 1934, the patient was returned to my office by the Welfare Board with acute symptoms in the right mandible and a definitely established fistula draining from the mucobuccal fold, opposite the first molar.

Fig. 6.—Extra-oral film of right side of mandible showing beginning of cyst at second molar and impacted incisor.

Fig. 7.—Left side of mandible showing continuation of cyst to first molar. There is normal bone in the first and second molar areas, with a separate cyst at the angle of the jaw and ascending ramus.

Fig. 8.—Occlusal view, showing cyst of mandible.

Fig. 9.—Anterior-posterior view of sinuses after removal of tooth and cyst from right antrum.

A specimen showed *Streptococcus viridans.*

Operation and Treatment.—The patient was hospitalized and the two cysts of the mandible were operated on, August 1934, under block anesthesia, with pentobarbital sodium and morphine as basic premedications. An incision was made along the gingival surfaces of the teeth from second molar to second molar, extending to the mucobuccal folds on each side. The mucoperiosteum was retracted, the greater portion of the labial and buccal plate of the mandible being exposed. At this time, the loose teeth were removed. The approach to the cyst was made by removing a portion of the thin cortical plate about midway between the alveolar process and the inferior border of the mandible. This was extended around, including the entire area and leaving the superior border of the alveolar process intact. The cyst was com-

Fig. 10.—Right side of mandible three months after operation.

Fig. 11.—Left side of mandible three months after operation.

Fig. 12.—Regeneration of right side of mandible one year after operation.

Fig. 13.—Regeneration of left side of mandible one year after operation.

pletely enucleated, bringing with it the impacted incisor, which was encapsuled within the cystic sac. The mucoperiosteum was placed in position and sutured over the remaining alveolar process, from first bicuspid to first bicuspid, the process acting as a support and framework to maintain the contour and shape of the jaw.

The wound was packed with 1-inch iodoform gauze from an opening on each side. The impacted third molar was removed and the cyst involving the angle of the jaw and ascending ramus enucleated.

Daily postoperative care was given by irrigating and repacking the wounds until

Fig. 14.—Appearance of ridge of mandible one and a half years after operation.

granulation was complete; *i.e.*, for about three months.

October 12, the impacted upper cuspids were removed and the cysts were enucleated. The antrum was slightly involved on the right. Routine postoperative care was carried out and granulation was complete on the left side in a short time. Drainage from the antrum continued on the right side through a small buccal fistula.

December 4, the second division nerve was blocked, as described by Arthur E. Smith, and the right antrum was opened through the canine fossa, and the cyst and tooth were removed. The tooth was attached to the distal and lateral wall of the antrum. Postoperative care was rendered in the usual manner, and, in a few days, the opening and fistula into the sinus had closed. Laboratory examination of each specimen, obtained by a competent pathologist, verified the diagnosis.

Comment.—Attention is called to the number, size and location of the cysts and the fact that such a condition could exist

Fig. 15.—Patient as she appears today.

in the mandible and sinus without the knowledge of the patient. The mandible was operated on without destruction of nerve or blood supply. Block anesthesia was the anesthesia of choice primarily because there was a possibility of producing a fracture of the mandible by the manipulation of mouth props. Regeneration has been sufficient that the patient can easily wear artificial dentures.

907 Consolidated National Bank Building.

VISIBILITY IN DENTISTRY: ILLUMINATION AND TRANSILLUMINATION

By A. LAURENCE DUNN, A.B., D.D.S., Santa Barbara, Calif.

VISIBILITY in dentistry is the link that joins the good judgment of the operator's mind with the technical skill of his hands. It helps him direct his aim toward the true diagnosis and permits him to attain a result in which he may have faith.

One of the primary injunctions for the dentist is, "Let there be light." Every surgical and technical procedure devised by a professional man and executed by his hands is based on the foundation of suitable light and good visibility.

This paper will deal first with the problem of placing light and obtaining visibility in the mouth, and will study and classify the various types of light. It will discuss in some detail those types that appeal to me as being the most serviceable and reliable. Secondly, it will show some of the results that can be obtained through the proper use of light in dentistry. Finally, it will present a system for getting these results in any location of the mouth under various conditions, both in diagnostic and in operative procedures.

It is interesting to consider that there can be such a thing as visibility technic. As dentists, we have made intensive studies of the technic of cavity preparation, the technic of gold inlay construction and the technic of cementation of finished castings. Yet we have overlooked one link in the chain, a fundamental link, extremely important in the completion of the whole. To a certain degree, we have omitted learning to see where we are working while we are working, or a visibility technic.

The requirements for illumination and visibility may vary slightly in the diagnostic and the operative fields. Diagnosis demands an excellent view of all objects to be studied, not only of their accessible surfaces, but also of the tissues within. On the other hand, many operative procedures can be accomplished in areas of diminished vision.

Half vision may be sufficient for certain steps, just as half of the top speed may suffice for a modern automobile; but when complete visibility or full speed is needed, nothing short of that will take its place. There are technics available for full speed in vision under practically all working conditions, which should be known and held ready for any emergency. The gratifying feature of learning these technics for unusual or emergency uses is that familiarity with them leads one to use them so regularly that he finds himself traveling constantly with visibility that corresponds to the top speed of his modern car.

WHAT CONSTITUTES VISIBILITY

There are three essential factors in good visibility: (1) accessibility, (2) cleanliness, or freedom from saliva and débris, and (3) illumination.

(Read before the Section on Operative Dentistry, Materia Medica and Therapeutics at the Seventy-Eighth Annual Session of the American Dental Association, San Francisco, Calif., July 16, 1936 [with color motion-picture].)

Accessibility derives from proper retraction of a cheek or depression of the tongue, correct use of a mouth mirror, suitable opening into a carious cavity or removal of sufficient bone or tissue for safe exploration. In other words, accessibility involves rendering accessible, either by direct view or by reflection, the parts to be operated on.

The second requirement, freedom from saliva and débris, is best fulfilled by the old-fashioned technic which has stood the test of time, the employment of the rubber dam. As an alternate, the use of cotton rolls in areas of genuine cleanliness and dryness is excellent for many procedures. Compressed air, the most rapid and efficient agent for drying, should be used constantly as required, unless sensitive tissues demand cotton pellets in its place. Three routines to be mentioned later, the roll and gauze routine, the buccolingual hold and grinding under water, are also valuable aids.

The third requirement in good visibility is illumination. Obtaining adequate illumination will be the foundation of this paper, but intimately bound with it throughout will be the other factors of accessibility and cleanliness of the field. The illustrations herewith will show how these three factors are regularly observed. They call for a system which follows these requirements and which can be thought of as a "one-two-three" routine, the routine of "Retract—dry—illuminate." Retract for accessibility, dry for cleanliness and illuminate for vision.

An accessory element of visibility is magnification of the image. This is obtained either with a magnifying mirror using reflection or with single or double lenses using direct vision. It is frequently of considerable assistance.

COMPARISON OF THREE TYPES OF LAMPS

	Availability	Directability	Re Shadows	Re Eyestrain	Overheating	Re Color	Use for Transillumination	Miscellaneous Aids
General illumination	Excellent if electrical	Fair	Fair	Fair	Excellent	Excellent	None	None
General directed illumination	Excellent	Good	Fair	Good	Good	Excellent	None	None
Local illumination (antrum type mouth lamp)	Excellent	Excellent	Excellent	Excellent	Good	Excellent	Excellent	*

*Used for obtaining accessibility and maintaining dryness of field. (Upper molar used as basis of comparison; operator in front of patient.)

KINDS OF ILLUMINATION

In determining what kinds of illumination are available for dentistry, we find four types, as shown by the composite picture, Figure 1. The first two are rather general illumination, the second two, rather local. They may be classified as follows: First is general illumination, the best example of which is daylight. Any type of illumination which gives a result similar to daylight, although it may be from a cluster of bulbs or indirect ceiling lighting, may be classed as general illumination. The upper left picture in Figure 1 shows the use of daylight and the Ritter cluster lamp.

If the light is centered in a particular direction by a single spotlight and is thrown predominantly by that spotlight onto the field of operation, it becomes general directed illumination. Examples of this are the "dualite" and the headlamp. The upper right picture shows general directed illumination, by a spotlight of fair size.

The third and fourth types, which are rather local, are called local illumination and transillumination. Local illumination comes from a small spotlight directed onto a tooth or tissues (Fig. 1, below, left). In my hands, the most satisfactory lamp for creating that light for general use is the mouth lamp of the antrum type with the metal shield (Fig. 2).

Fig. 1.—Four types of illumination available for use in dentistry.

Transillumination comes from that small spotlight directed so that its rays pass through the tooth or tissues, again originating from the mouth lamp of the antrum type.

IDEAL LIGHT

In attempting to determine the type

of light which most nearly approaches the ideal, it would be well to study the fundamental requirements of such a light. 1. An ideal light must first be available at any hour, day or night, winter or summer. That means that it must be electrical. 2. It must be such that it can be directed anywhere in the mouth with a minimum of inconvenience. That means that it must be adaptable. 3. The operator's head, hands or instruments must cast no shadows. That means that, in general, the light should originate from a source beyond the finger tips. 4. It should relieve rather than tire the eyes of both patient and dentist and should not shine into the eyes of either. That requires correct technical construction and adjustment of the lamp. 5. It must not overheat, to the inconvenience of the patient or the dentist. 6. It must not distort the color value of inflamed gingival tissue. 7. It must be readily available for transillumination.

Fig. 2.—Mouth lamp, antrum type.

The accompanying table affords a comparison of the three types of lamps and the way each meets the seven requirements.

It will be noted that the mouth lamp of the antrum type is given a rating of "excellent" throughout, with the exception of the fifth requirement, freedom from overheating. When overheating does occur, it is from one or more of three causes: (1) The lamp has been turned on too brightly, (2) it has been kept in operation for too many minutes without a cooling period (except in emergencies, its resting period need never exceed that for the patient) or (3) the filament is getting old and will shortly burn out. In those cases that demand extra brilliance temporarily, the current may be turned on stronger, and when the lamp begins to overheat, it may be immersed in the patient's tumbler of rinsing water for five seconds, with the light turned off, of course. In my hands, and I use the lamp almost constantly as a retracting device, its overheating is so negligible as never to need consideration as a problem.

Fig. 3.—Light from 100 watt lamp, reflected by head mirror (method of local illumination used by Carl D. Lucas, Los Angeles).

One other specialized form of local illumination of great value in oral surgery and exodontia is that shown in Figure 3. It was brought to my attention by Carl D. Lucas, of Los Angeles, who uses it exclusively in his surgery. The source of illumination is a 100 watt lamp, reflected as shown by the head mirror. The resulting beam is highly localized and brilliant and is readily directed.

Each lamp has its own individual and extremely helpful uses, but, in my opinion, the lamp which by itself most nearly fulfils all of the requirements for general

practice is the metal mouth lamp of the antrum type, the small spotlight. It is capable of throwing light onto the tooth and through the tooth interchangeably as desired.

The second choice would be the cluster type of lamp (Fig. 1, above, left), for a steady, dependable general illumination. Neither takes the place of the other, and each aids in giving well-balanced lighting on the equipment and face, and within the oral cavity. An extremely helpful adjunct is the large spotlight of the type shown in Figure 1, above, right, although its usefulness does not equal that of the more mobile small spotlight.

MOUTH LAMP, ANTRUM TYPE

The mouth lamp of the antrum type having been selected as the most suitable for general practice, the effect of using that lamp will next be studied. As the results of transmitting light through a tooth are less generally known than the results of placing light directly on the visible surfaces of the tooth, this second section will deal mainly with transillumination and secondarily with local illumination.

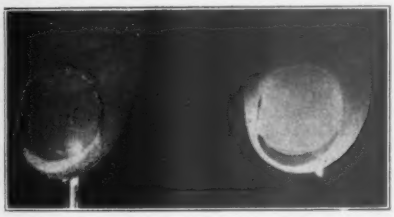

Fig. 4.—Effect of transilluminating thumbnail (débris corresponds to decay in tooth).

An interesting test to show the results of the two types of illumination from the mouth lamp is made by throwing a light alternately onto and through the end of the finger. For the simple purpose of study, this can be done with either a mouth lamp, a flashlight or any other restricted source of light. Local illumination will make a thumb nail appear as at the left in Figure 4, while transillumination will bring all the débris beneath that nail boldly into view as an opaque shadow, as shown at the right. That débris, of course, corresponds in the case of the tooth to the decay within.

The manner in which the spotlight type of illumination can be of help in diagnosis is shown in Figure 5. With the beam directed alternately onto the tooth and through the tooth as required, in a dry, accessible field, a far more precise picture of conditions within is obtained than when the pick-and-hunt system of mouth mirror and explorer alone is used.

Fig. 5.—Upper second and third molars viewed by combination of local illumination and transillumination.

The fundamental reason for many inefficient examinations is not that the dentist cannot recognize decay when he sees it. Rather, it is that he cannot see decay to recognize it. Hidden in the dark cavern of the mouth and covered with a translucent mass of saliva, the caries shown in Figure 5 has been passed by for more

obvious conditions until it has become dangerously deep. Transillumination is the finest method for detecting decay of this type, even surpassing the roentgenogram, which, nevertheless, is indispensable in mouth examination.

Possibly a truer understanding of how transillumination works can be gained by studying the series of four pictures of this molar (Fig. 6, above). Here, the extracted tooth is lighted merely by daylight, the mouth lamp being off. (The second lamp is present merely for photographic purposes.) In Figure 6, below,

Fig. 6.—Above: Molar without transillumination. Below: Molar with transillumination. The occlusal defects and opaque areas within the tooth are evident.

the lamps are lighted, showing the opaque areas where decay exists. Figure 7, above, records the decay as seen by the roentgenogram (the notches being merely for identification). Finally, in Figure 7, below, the sectioned tooth is viewed by transillumination. The presence and extent of the decay are evident.

The occurrence of that decay was a chemical problem; the discovery of it was a diagnostic problem, and the treatment of it an operative problem. Both diagnosis and treatment require good light for proper care.

Here again, in an anterior tooth, is shown the usefulness of transillumination in diagnosis (Fig. 8). The picture expresses better than words how the light shining through the tooth, rather than on it, gives more than surface visibility. It gives visibility with the third dimension; that is, with depth.

Other examples of how useful transillumination can be in diagnostic and operative procedures are presented in the following pictures. Calcareous deposits on the lingual surfaces of lower bicuspids are readily distinguished, as in Figure 9.

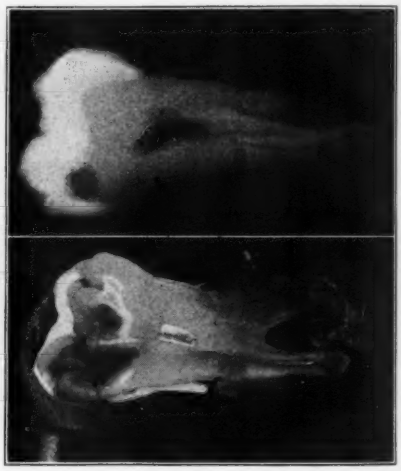

Fig. 7.—Above: Roentgenogram of molar shown in Figure 6. Below: Same molar sectioned, with transillumination.

The use of transmitted light in the safe grinding out of fillings is demonstrated in Figure 10, where a gold inlay is being cut across. In this case, as in the case of drilling through most fillings with the aid of transillumination, as soon as the foreign material is completely pene-

trated, the spot of light appears through the tooth substance. This, possibly the finest safeguard available in grinding through fillings, should be relied on universally. Any mass or even a shred of metal or cement remaining to connect the two halves becomes immediately visible.

OTHER USES OF TRANSILLUMINATION

There are many other uses of transmitted light in addition to those discussed above. Nothing more than a mention of them will be attempted at this time.

In gold-inlay construction, the wax pattern, particularly for a three-quarter veneer or pinlay, can be checked for dangerous thinness while still in place, by transilluminating the tooth. The adaptation of a matrix band, for either inlay impression work or the placing of a silver filling, can be checked as in Figure 11. This is particularly helpful in deep subgingival cavities.

Fig. 8.—Studying and eliminating carious areas with aid of safe-guarding beam of transillumination.

Possibly the most practical clinical method for testing the perfection of porcelain is transillumination. If, before the cementation of a porcelain jacket crown, it is studied with a magnifying glass and transmitted light, even extremely small areas of porosity will become quite apparent. Likewise, in searching for checks or cracks in any porcelain, whether jackets, facings or tube teeth, the use of light is very informative. The transmitted ray should be used in two ways: For studying defects such as cracks, a light shone straight through the porcelain and into the eye of the operator is best. For studying defects of internal structure, such as bubbles, as well as for studying all porcelain which has been cemented to a gold backing, a light directed at the thin edge of the porcelain and at right angles to the operator's line of vision is most successful.

Fig. 9.—Calculus at and beneath free gingiva, transilluminated.

Hypoplastic enamel, cracks in the dentin or enamel and decalcified areas are readily noted with transmitted light. In gold-foil work, particularly in the placing of Class 5 fillings, transillumination is of inestimable value in the observation of the final traces of gingival decalcification and in the selection of areas in which the cavity outline is to be finished.

In the testing of a tooth traumatized by a blow, transillumination has a place of importance equal to that of the faradic tester and ethyl chloride. In many cases,

it will be the only test available that will indicate a change in the pulp tissue immediately following the injury. Infiltration of the dentinal tubuli with hemoglobin will be demonstrated by a reddish opacity in the coronal portion of the tooth, on applying the light for diagnosis, whether immediately after the blow or at any subsequent time.

In exodontia and oral surgery, transillumination assists materially in locating broken roots, chips of old silver or cement lodged in sockets, root-canal filling material that has been forced beyond the canals and other foreign bodies.

A root canal that is to be opened for the first time, or is being cleared of an earlier canal filling, can be detected and followed to great advantage with transillumination. Especially is this true in drilling into a canal, should the tooth be retained and its restoration require a post.

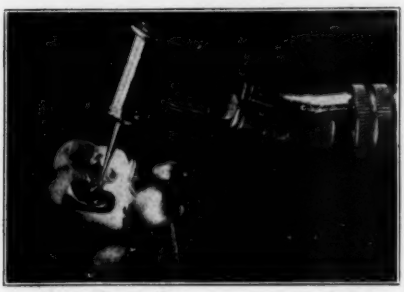

Fig. 10.—Method of cutting through old filling with complete safety to pulp and remaining tooth substance.

Incidentally, I have no faith in the diagnosis of pyorrhea by transillumination. What is sometimes accepted as evidence of a pyorrhea pocket is generally nothing more than salivary or serumal calculus. I do not mean to imply that the pyorrhea pocket is not present in these cases. I do mean that, in my opinion, the calculus and not the condition associated with the infection is the diagnosable agent, and that, on removal of the calculus, transillumination no longer will serve as a suitable means of determining the location or depth of that pocket. In addition, in studying gingivitis, transillumination does not compare at all favorably with the use of local illumination.

All the foregoing pictures and descriptions of this series express a certain principle; namely, that light which shines through tissues gives visibility of a very different quality and of a different usefulness from light directed on tissues. The illustrations are merely examples of that principle. The accuracy of what they portray cannot be truly appreciated until it has been experienced personally by the operator.

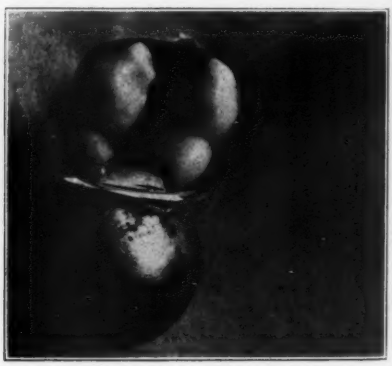

Fig. 11.—Checking gingival adaptation of matrix band.

HANDLING THREE INSTRUMENTS

Having presented a number of the local uses to which the mouth lamp can be put, this paper, in its final portion, will present a short summary of how to handle the lamp to get results while operating. Names will be supplied where necessary. We shall start by accepting the mouth

lamp of the antrum type as providing the light most suitable for general practice. The next problem is that of learning to place its light where needed and when needed.

We must face the fact that this most versatile light comes from a lamp which has to be held in the hand. The employment of one hand for operating and the other for illuminating may be regarded as bothersome; but actually it is a blessing.

Recalling the requirements of good visibility as being accessibility, cleanliness or dryness and illumination, we recognize that few dental operations are accomplished without continual retraction of the cheeks, depression of the tongue and

Fig. 12.—Using mouth lamp with single hold.

holding of cotton rolls. This means that some instrument must be held in the non-operating hand to perform these services. There is possibly no retracting instrument on the market today which has a form better suited to such auxiliary functions, when used by the operator, than has the mouth lamp. Consequently, we may be very grateful that we have found an instrument which can retract, depress and hold and, in addition, give light. These auxiliary functions of the lamp are of extreme importance to the dentist who is eager to develop the efficiency of his hands.

Since the lamp is to do the retracting and illuminating, and since the mouth mirror must also be used much of the time, the most satisfactory use of the mouth lamp will come from learning to manipulate two instruments in the same hand at the same time. If you feel that this cannot be done, try to recall your early dental operations, and remember how quickly you taught untrained hands to do your bidding. Trained hands will respond even more rapidly.

A surprise which is encouraging will be experienced when it becomes evident that the simple steps which follow will quickly teach the concurrent use of two instruments in one hand. Soon increased digital dexterity and ambidexterity will

Fig. 13.—Learning to handle two instruments simultaneously, first step of double hold.

be evident, as well as the considerable elimination of the need for an assistant's services in operating. How to make the left hand, or the non-operating hand, do the work of two hands will be learned. Particularly, increased use is made of the little finger of each hand.

One note of encouragement might be suitable at this point. This is not a difficult technic to master, and can be learned by the so-called average dentist as rapidly as his interest in it and enthusiasm for it dictate. It is a definite step forward, as was the introduction of the mouth mirror

to dentistry. Moreover, if you will recall, the mouth mirror was at first slightly awkward to handle, but indispensable as soon as mastered.

The first hold to be learned is the single hold, shown in Figure 12, which is used where, in general, the lamp will be the only instrument held in the left hand. It has many variations, but is essentially the hold used in writing with pen or pencil. Its use in displacing tissues, holding cotton rolls and supplying light is so obvious that we shall not need to discuss it further than to say that its constant use is of extreme assistance.

Fig. 14.—Complete double hold (affording two hands on one wrist).

THE DOUBLE HOLD

The double hold is slightly more complicated. Since it is fundamental in this technic, I shall describe in detail how it is developed and used. In Figure 13, we see the lamp, resting in the crotch of the thumb and between the last two fingers. This step is purely for instruction purposes and not for actual use. It is most important to note that the lamp is seldom lifted from the *deepest portion* of the crotch of the thumb, nor off the *second* phalanx of the *little* finger.

With a pencil representing the lamp and a fountain pen serving as the mouth mirror, how simply one can learn the double hold becomes evident. Holding the "lamp" (or pencil) in that manner, it is now evident that there are three unused fingers, an additional hand, which is put to work. This completes the double hold, shown in Figure 14.

The "lamp" must be gripped firmly with the crotch of the thumb. This will prevent its being unseated when we bear down heavily on the far end. It will be noted that a load of many pounds can be resisted. If pressure is applied in the reverse direction, it is possible to resist even a greater force, the third finger and the crotch of the thumb taking the load in this case. As a final step in self-instruction, the "lamp" (or pencil) is held firmly as pictured and how pressure can be applied from any direction and very steadily resisted is determined. This will be found possible provided the instrument is held exactly as directed.

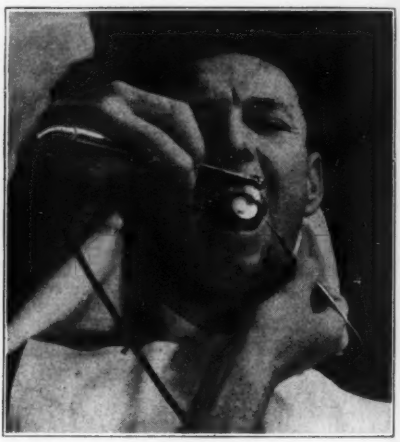

Fig. 15.—Using double hold in mouth examination.

The foregoing represents a simple principle which can revolutionize the abilities of an operator. Its utilization will result

not only in an extra hand being always present, but also in great progress toward increased manipulative ability. The double hold at the chair is learned just as easily as it was learned this moment with fountain pen and pencil. Its use is not limited to the combination of lamp and mouth mirror, but may include a great variety of other arrangements as well, involving gold-foil instruments, water syringes, compressed air syringes, amalgam carriers and pluggers and cutting instruments.

Fig. 16.—Mouth examination.

WHAT IS A HAND?

If we stop for a moment to study the requirements of a hand, we find that it must have three fingers, or stabilizing points, to perform its function ideally. With fewer than three, nothing is held firmly. Holding the pencil with two and then three fingers will demonstrate that three gripping points stabilize; fewer than that cannot make retention secure. And with every three or more gripping or stabilizing points, you have a hand, in function. Figure 14 shows how each instrument is gripped, or stabilized, at three points.

The double hold will give you the efficiency of three hands, two of them on one wrist. The left hand need not run in low gear when a simple shift will put it in high.

The use of the mouth lamp and mirror, combined as one instrument, as commonly supplied by the manufacturers today, greatly restricts the usefulness of each. When they are united, the independent use of each is restricted and the lamp cannot be used for transillumination. There are occasions when the combined apparatus is of considerable help,

Fig. 17.—Buccolingual hold, for maintaining good visibility of lower teeth.

as in gold-foil operations. In general, I find the double hold much more efficient, permitting completely independent employment of each instrument as and when needed.

Having learned the method of carrying and using the mouth lamp and mirror at the same time, yet independently, we are ready to take them to the mouth for examination. While the necessarily limited illustrations cannot take the place of the motion-picture, they will serve to record certain positions of movement. Figures 15 and 16 show the use of both instruments in two of the regions of the mouth.

That the requirements for good visibility, "retract, dry and illuminate," have been fulfilled is evident.

ROUTINES

One helpful technic in which the lamp serves as a retracting, holding and illuminating device is the buccolingual hold, shown in close-up in Figure 17. It is an extremely successful solution for completely defeating a powerful tongue, and is used for short operations on the lower teeth.

Another procedure, used for upper teeth, is called the roll-and-gauze routine. This is the name selected because a cotton roll blocks off the saliva and a folded 6-inch square of gauze lies on the tongue. The presence of the gauze is of great help in keeping an inquisitive tongue quiet and in preventing débris from falling into the mouth. The close-up, Figure 18, gives an idea of how local illumination and transillumination are used interchangeably, and the excellent degree of visibility this routine affords.

Fig. 18.—Roll-and-gauze routine, for maintaining good visibility of upper teeth.

As every dentist who has personally experienced it will appreciate, the flowing of water onto a tooth during grinding, with either a stone or a bur, greatly reduces the heat of friction, lubricates the grinding instrument and diminishes the discomfort to the patient. In addition, it gives the dentist a field of operation which is washed clean continuously, permitting him to proceed more carefully and safely. To assist in this and to illuminate the field brilliantly, as well as to keep the tongue or cheek constantly displaced, there is the grinding-under-water routine. One of the holds used in it is shown in Figure 19.

With so much of the gold inlay work of today being done by the direct technic, in which the completed wax pattern is carefully withdrawn from the mouth, the compressed-air hold is of great assistance. There is shown in Figure 20 the method by which the lamp is held for retraction or depression, and illumination; while directly adjacent to the head of the lamp is the tip of the compressed air syringe. With this technic, a wax pattern may be removed with the sprue delicately imbedded into it, from a dry, accessible and brilliantly illuminated field.

Fig. 19.—Grinding-under-water routine, for illuminating, retracting and flushing, and for lubricating stone or bur.

The compressed-air hold is used also as an aid to cavity preparation when

work is done with the rubber dam in position, keeping the cavity constantly freed from débris.

To make the use of the lamp with the double hold smoother and more efficient, there are numerous important methods for the rapid and easy disposal of either it or the other instrument. Only two methods will be mentioned in this paper. One is the flip, shown in Figure 21. The

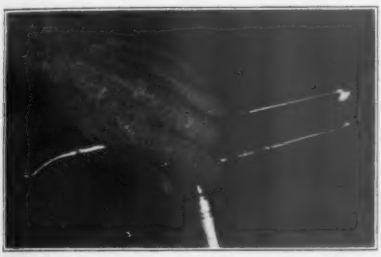

Fig. 20.—Compressed-air hold, for cooling tooth or inlay sprue, etc.

Fig. 21.—One of two methods for rapid disposal of lamp (flip method).

other is the little-finger hold (Fig. 22). The former allows the rapid elimination of the mirror when the operator is about to dry the field with compressed air. The little-finger hold is still another way to dispose of an instrument without laying it down. Both of these disposal methods are of far greater importance than this short mention of them indicates.

GROUP EXAMINATION

I cannot permit the opportunity to pass without expressing my opinion of the present methods of group examination of patients, particularly the examination of school children. The well-equipped private practitioner relies on two things for a view within the tissues he is studying. These are the roentgenogram and transillumination. Roentgenographic equipment is found in so few of the school examination units of today as to be an oddity. Its use with at least the bite-wing roentgenogram should be universal.

Fig. 22.—Method for disposal of lamp (little-finger hold).

There may be the excuse of lack of funds for failure to install and use roentgenographic equipment; but I can see no excuse for the failure to provide and utilize as the first and main adjuncts to a thorough diagnosis, not the mouth mirror and explorer, but the mouth lamp and a good supply of compressed air. No community that can afford to pay for any dental services can afford not to supply these.

The mouth lamp, compressed air and eyes trained to view opaque areas within tooth substance will readily detect most initial decay. This is true in such a high percentage of cases where the view is not

obstructed by old fillings that, in my opinion, examinations should depend primarily on sight (local illumination and transillumination in a clear field, and the roentgenogram) and secondarily on touch (the explorer).

CONCLUSION

With the four types of illumination available for use to cover all circumstances and with a technic for obtaining visibility under practically all conditions, there is given the dentist of today an opportunity for relieving himself and his patient of much of the strain of earlier years. At the same time, the safety, speed and efficiency of his operations are directly increased.

The study of all physical objects is based on both seeing and understanding them. With the increase of the educational light of knowledge, more understanding is gradually being brought to dentistry. As a foundation for increasing that understanding and conducting operations based on it, the profession needs the physical light of good visibility.

SUMMARY

Visibility is one of the corner-stones of both diagnostic and operative dentistry. It consists in: (1) accessibility, (2) cleanliness of the field and (3) illumination.

Illumination is either general, or "spotlight"; and, in addition, is either made to shine on the tissues, or through them. Consequently, it may be classified as: (1) general illumination, (2) general directed illumination, (3) local illumination and (4) transillumination.

The most efficient types are the latter two, both of which originate to greatest advantage from the mouth lamp of the antrum type. This lamp, when handled properly, also assists in fulfilling the other requirements of visibility; *i.e.*, obtaining access and maintaining cleanliness of the field.

Certain fundamental holds, movements and routines have been developed which permit excellent visibility in any location within the mouth under virtually any working condition. Associated with the development of visibility technic will be found greatly increased dexterity and usefulness of all ten fingers. The end-result is twofold: (1) increased manual ability and (2) safer, faster, easier and more exact diagnostic and operative procedures.

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DISCUSSION

Carl D. Lucas, Los Angeles, Calif.: No branch of the healing art depends so much on the sense of sight as the art of dentistry, and restorative dentistry is the most dependent of all branches of dentistry. If proper illumination of the operative field is to be gained, accessibility to the field for transmission of light to the tissues involved is the first requisite. Dr. Dunn's technic in the use of the lamp as a lip and cheek retractor with the illumination directed through the field of inspection toward the diagnostic mirror is positive in direct illumination and in transillumination. By the technic that he employs, diminished visibility for diagnosis and operative procedures is supplanted by complete visibility. Direct or reflected vision is dependent on a dry field, which is readily obtained by the use of cotton rolls and gauze, by proper adaptation, fixation and retention through digital dexterity. This and the use of compressed air are the technics which Dr. Dunn has clearly detailed in his paper and demonstrated by photography. General illumination of the entire field by daylight is indefinite because of the vastness of the illuminated area. Careful inspection of oral conditions demands concentration of thought on individual organs. When one inspects roentgenographic negatives of teeth, he must focus his attention on each tooth and its surrounding area as an entity and carefully record findings in individual

areas in sequence. General illumination of the oral cavity is too extensive for diagnostic purposes because individual areas in sequence cannot be definitely studied, and therefore records of details must be wofully incomplete. General directed illumination, in which light is focused or centralized on definite areas in sequence, enables the operator definitely to observe specific conditions as they are disclosed without seeing the mouth merely as an entity in a generalized scope of diffused light, and thus overlooking individual lesions which would otherwise be centralized for direct study by direct or focused illumination. Local illumination represents the *ne plus ultra* for definite vision of a restricted area. With the attention directed exclusively to a definitely localized area, the powers of perception are augmented to the highest degree through elimination of confusing generalities. Transillumination of a tooth or the maxillary sinus defines abnormalities by focusing shadows to vision. Local illumination, the source of light which may be employed for transilluminating and may be available at any hour, can be conveniently focused on any point in the mouth, can be produced beyond the finger tips, does not shine in patient's or in operator's eyes and, if properly transmitted, will not distort the color value of inflamed tissues. Local illumination, from the concave laryngoscope, focuses reflected light from a 100-candlepower frosted globe on the operated field within an illuminated area approximately 2 inches in diameter, the field being brilliantly illuminated without distortion of color of normal or inflamed tissues, since the reflected light is focused definitely on the area without confusion incident to irrelevant tissues and structures. Concentrated reflected white light definitely focused on a limited field produces ideal illumination for definite and positive visibility of microscopic lesions. We are somewhat at variance with the statement that the finest light available comes from a lamp which is held in the hand. In oral surgery, which is a specialized branch of dentistry, such a light could not be of universal service, because both hands are quite frequently employed in operative technics, such as suturing, retraction and dissection of tissues. In many cases of oral surgery, the antrum lamp is inefficient as a retractor on account of its size, shape and inadaptability for engaging tissues for their retraction. The laryngoscope of the concave reflecting mirror type affords the best type of illumination for oral surgical technic because both hands are entirely available for retraction of tissues, instrument manipulation and tying of sutures. The finger dexterity which Dr. Dunn has so graphically presented to the profession is an innovation of inestimable value to the operative dentist. An effort has been made to perfect the manipulation of two or more instruments simultaneously in either hand, and to a degree has been successful. Digital dexterity is the most essential adjunct in dental technic. The man who is most dextrous is consequently most efficient in the handling of tissues, instruments and materials. Ambidexterity is an essential to any man who depends on his hands for production. The dentist may possess superlative knowledge in the science and art of dentistry, but his operative results will be miserably deficient unless he possesses or ultimately develops digital dexterity. The more nearly he approaches efficiency in ambidexterity, the better will be his operative ability. Every dentist is efficient in the single hold, but every dentist should become efficient in the double hold, which affords the efficiency of three hands working in unison. Dr. Dunn has not only given us a visible portrayal of these various holds, but also his word pictures are graphic and perspective.

IMMEDIATE FULL DENTURE SERVICE

By BENJAMIN F. JOHANSON, B.S., M.A., D.D.S., Battle Creek, Mich.

IMMEDIATE full denture service in the sense here considered, that is, in the meaning generally applied to it in the dental literature, consists of constructing one or both artificial full dentures before the natural teeth are removed and preparing the mouth surgically so that one or both dentures can be inserted at the same sitting that the teeth are extracted. The patient is spared the embarrassment always associated with an edentulous period. He is never seen without teeth. If the work is skilfully done, few people need to know that the natural teeth have been lost. This service expresses the highest art of full denture prosthesis. It represents the most satisfactory solution of a problem that has harassed our older patients since time immemorial. It gives many unfortunate people a hope hitherto denied them.

The original procedure was, first, to eliminate all posterior teeth and allow the sockets to heal. This extraction was usually done piecemeal. A denture was then constructed, the porcelain of the anterior portion abutting what it was assumed would be the anterior ridge after the removal of the teeth in this area. Sometimes the porcelain or base material was projected into the socket, three-sixteenths to one-quarter inch. Then the operation was completed by the extraction of the remaining natural teeth; and, without any kind of surgical or medical treatment, the denture was inserted. This would doubtless today be considered standard practice by the ultraconservative; but, even by its advocates, it was looked on as a sort of temporary expedient, something to be made hurriedly and cheaply and intended to serve only until Nature should have had time to shrink the ridges, or while the gums could heal for a so-called permanent denture. It is known now that the materials used in dentures are relatively more durable than the foundation upon which they are constructed. Nature does not prepare and leave the alveolar ridges in an ideal condition for dentures or even in any static condition; hence, there cannot be what has in the past been termed a permanent denture.

As practised today, insertion of the primary denture at the time of final extraction is comparable in every respect to the best denture service of which the operator is capable. This denture has a full buccal and labial periphery. Careful consideration is given to mouth preparation, vertical dimension, esthetics, comfort and utility. The patient is kept under observation so that corrections can be made when necessary.

EVOLUTION

In the sense here being considered, except possibly in the matter of surgery, immediate denture service has been practised as long as we have had vulcanite, which is about three-quarters of a century. The practice, until recently, has never been regarded with general favor. The interest manifested in the subject during the last few years has in reality made of it a new field in denture prosthesis. That it can now be practised with better results than in earlier days is due

to the advancement that has been made in prosthetic dentistry as a result of study and research during the last decade or more, and, further, to the application of more exact surgical procedures to the extraction of teeth and the preparation of mouths for full dentures.

LITERATURE

A search of dental periodicals and textbooks reveals that there is not at present a very comprehensive or satisfactory literature on the subject. While a process is in a state of rapid development, many of our best informed men seem to hesitate to commit themselves to anything as static as the printed page. Certain recent articles do treat the subject adequately; others less than 5 years old still advocate methods practised a generation ago, and think of this as a quick and easy way of bridging an uncomfortable period for the patient. A study of the literature reveals also a diversity of opinion; as is to be expected with a comparatively new procedure. This is particularly true of the technic to be employed. It is not my purpose to further confuse the issues involved nor to assume any dogmatic attitudes, but rather to attempt a fair analysis of these differences, to show that the orthodox procedure is unnecessary in the light of the possibilities offered and, further, to offer certain suggestions relative to the problem.

SURGICAL DIFFERENCES

From the surgical aspect, opinions vary as to amount of tissue to be removed, the method of such removal and the extent of any given operation. Shall teeth be extracted serially or all at one sitting? What instruments best serve our purpose? In the hope of avoiding trauma, some would confine the mouth preparation to the simplest modes of extraction. Others resort to extensive removal of buccal and labial plates of bone, often approaching the apices of the teeth. The former urge that soft tissue be left undisturbed, if at all possible, with no suturing. The latter excise conservative or generous portions which are considered superfluous, and close the wound with sutures. For the cutting of bone, certain operators employ, others frown on, the use of stones, burs and drills in the dental engine. Some prefer only files and rongeur forceps; while others make extensive use of the hand mallet and chisel. Complaint has been made of unnecessary trauma and of the unfavorable psychic effect produced by the use of the mallet and chisel. No doubt, objection can be sustained against the use of any of these agencies when improperly employed or in the hands of unskilled operators. The prime consideration here is not the particular instrument, but the result. Unquestionably, there is a trend toward conservatism in surgical measures in denture work and away from the radical procedures suggested about twenty-five years ago. Unquestionably, also, there is a rather general agreement among all concerned that better results are assured with some sort of mouth preparation.

The amount of tissue to be removed in a given case must necessarily vary with the judgment of the operator and the requirements of the particular case. It cannot be absolutely standardized. The ideal would seem to be to excise the least amount that is commensurate with good denture results and, if the tissues have been considerably retracted, to close the wound with the minimum number of sutures required to hold the flaps in apposition. Without sutures, in certain cases there might be a tendency of the wound to open during the insertion and to keep open on any slight movement of the appliance. Many of the best operators consider sutures optional. Approximately as

much tissue should be removed as would naturally be absorbed in from one to three years. The operation could well be performed in such a manner that trauma, as manifested by postoperative pain, swelling and ecchymosis, will be reduced to a minimum.

The scope of this article does not allow for a detailed discussion as to why the anterior periphery of the denture should be included in all cases. The older method, while being conservative, does present disadvantages. At some stage in the procedure, the lips are allowed to collapse, thicken and shorten, with disturbing effect on the facial contour. No doubt, the value of a denture is materially enhanced if it has a complete periphery, but that involves operative measures in this area.

From a mechanical aspect, satisfactory results can be attained by removing all remaining teeth from one jaw or even both jaws at one sitting, or, on the other hand, by extracting the teeth by stages; except that one essential reason for this service is the fact that anterior natural teeth may be replaced by artificial substitutes without an edentulous interval. Therefore, it becomes necessary to extract all anterior natural teeth in one operation. The reaction of the patient to surgical work in the mouth must always be a factor in determining the extent of any given operation. Depriving the patient of the use of all bicuspids and molars for a number of months, and thus permitting formation of a habit of masticating on the incisors and cuspids and allowing the tongue to widen so as to occupy the space of the lower molars should not be considered without some thought as to the effect of such a procedure. The development of abnormalities of the condyle and other degenerative changes which shorten the distance between the upper and lower posterior ridges, when unsupported by teeth or splints, are said to take place. If the posterior teeth are eliminated months before the anterior teeth, the healing following the extraction of the anterior teeth will cause the denture to ride unevenly, thus necessitating an earlier reconstruction. Moreover, many patients will object to a secondary operation if it is not considered imperative, preferring to have all surgical preparation of the mouth carried out at once.

PROSTHETIC DIFFERENCES

Prosthodontists also differ in their ideas of the technic involved. Manifestly, if no bone is removed from the labial plate, the porcelain must abut the ridge or there will be an undue distention of the lip and the face in this area. It has been my practice in all cases to remove enough of the labial and buccal plates of bone that the denture may be constructed with at least a thin buccal and labial periphery.

In carving the cast preparatory to setting up the teeth, some operators remove all the remaining teeth of one cast at once, then carve and smooth, as it is anticipated that the mouth ridge will be smooth after surgical preparation. This has been my practice. Others cut off all the teeth in one quadrant, or one tooth at a time, or even alternate teeth. Each plaster tooth eliminated makes room for a substitute in porcelain. The reason advanced for doing this part of the work by sections is that the porcelain may be properly oriented and that the investing tissues about remaining portions may indicate the fulness of artificial material to be placed about the new substitute. These various methods are all satisfactory, provided the end-results are correct positioning of porcelain teeth and adequate lip fulness, with proper interdental space and a smooth even cast. With the use of pre-extraction records, there need be no difficulty in properly orienting the porcelain teeth,

even if all plaster teeth are removed from one cast, but not from both casts at once.

It will be obvious that in the process of constructing a denture on a cast that has been altered, and later operating on the mouth to receive this denture, the fit can be only approximate on that part of the ridge which has been changed by operation. Some men feel that such a procedure should be limited to cases in which there are only a few remaining teeth, as they say it cannot otherwise be carried out accurately enough. Furthermore, there are divergent opinions as to whether this discrepancy should be overcome by the use of an intermediate substance, sometimes called a surgical pack, which has bulk and medical properties, or left for Nature to correct, with or without the aid of a medicament.

THE SURGICAL PACK

The pack has distinct advantages. It acts as a means for securing a better-fitting splint than if the denture alone were used. It affords an accurate immediate means of relining. It has analgesic and antiseptic properties. The psychologic effect on the patient is favorable. He will say: "Doctor, my gums are going to be very sore, and you propose to place a hard plate on these sore tissues." The answer is: "The new plate does not touch your tender gums at all. We use a soothing surgical preparation that refits the denture exactly to the mouth and holds it evenly and securely. It acts like a splint, keeping the wound from opening or being irritated by movements of the tongue, or passage of food or air. Your gums are even better protected than by the old method. If you do not remove the appliance for several days, the irritation will be further minimized."

I have used the pack rather extensively, with gratifying results. No untoward effects on the soft tissues have ever been evident. The patient returns after several days with healing progressing more satisfactorily than when no splint at all is used, and with no evidence of the characteristic disagreeable odor which sometimes follows extensive extraction by the older method. Frequently, owing to pathologic or other conditions, more hard or soft tissue is removed during the operation than was expected; or, in the case of the beginner, there may be a doubt as to the ability to prepare the mouth with sufficient accuracy; and here the surgical pack would seem to be ideal, if not actually necessary to restore the undetermined dimension.

It must be recognized that there are disadvantages to its use. It can be employed to cover inaccuracies and careless workmanship. The patient may, from its use, easily become accustomed to a tight denture, demanding frequent refitting, even with the more nearly permanent base material. The pack is not of sufficient permanence to tolerate vigorous brushing and prophylactic measures, which are essential, especially during this period. Sections are easily broken, rather frequent repair or renewal of the entire mass being required. The patient objects to the bitter taste of the eugenol. The pack takes up a definite amount of space and compresses the flexible plastic tissue. Therefore, this denture, if it is to be retained in use, must be reconstructed with the base material employed at such time as the pack is discontinued. These objections add to the time and expense involved, and sometimes to the hazard; for the difficulties encountered in extensive alterations of the base material, and the reregistering of a new jaw position without disturbing centric relation or causing other disharmonies of occlusion will be apparent to all denture workers. Therefore, if it can be shown that the surgical pack is not needed in every case, that

some other medicament which occupies no appreciable space, or even nothing at all, will serve the purpose as well, it can be dispensed with.

CORRECTION WITHOUT PACK

If the pack is rejected, Nature is expected to make the necessary adjustment. Since, by this method, no appreciable space is taken up by an intermediate substance, no correction of the base material of the appliance is needed; *i.e.,* if the fit remains satisfactory and other changes are not deemed necessary. The theory* upon which this practice is based is that although the fit can be only approximate on that portion of the ridge which has been changed, the discrepancy is taken up by distension of the soft flexible tissues by the blood clot to conform to the bearing area of the denture. The formation of fibrous tissue under the soft flaps holds the structures in close approximation with the denture base. This fibrous tissue later develops into bone. It must be noted that since this adjustment can take place only in the field freshly operated on, all other portions of the bearing area of the denture must have been constructed upon an accurate, unchanged cast.

Those who prefer to use the pack can well take advantage of this theory, if it is tenable, by using the least possible amount which will serve their purpose; for the ridge would be flattened and diminished in size somewhat in proportion to the amount used.

Those who prefer letting Nature make the necessary correction place in the denture an adhesive powder, a topical anesthetic or nothing at all. At this point, I would emphasize, for operators who prefer this method, the desirability of using a medicament having antiseptic as well as analgesic properties, which, when placed in the new denture, need not occupy perceptible space nor compress the unsupported tissue flaps. The reason for using an antiseptic drug will be apparent since a very unsanitary condition is always observed in connection with the appliance if it is left without such treatment for from twenty-four to forty-eight hours, as is usually advocated. Where tissues freshly operated on are to approximate denture base material, that portion of the cast which corresponds to the denture-bearing area, and likewise the tissue-bearing area of the denture, is highly polished so that the healing tissues may contact a smooth surface.

*Kemper, J. W.: Personal communication to the author.

AGREEMENT

The foregoing has been an attempt to analyze divergent opinions regarding methods of construction and mouth preparation. In this conflict of ideas and technic, there should be a steady and earnest effort to find the best way. On another aspect of the subject, there is very general agreement. The profession says, with an almost unanimous voice, that immediate replacement of natural teeth with full artificial dentures is now good practice. All operators believe that better end-results are secured by a method which eliminates the edentulous interval, and that the advantages to the patient are outstanding. The attitude of the recipients is one of genuine enthusiasm and appreciation. Often, surprise is expressed at the ease with which seeming difficulties are overcome.

ADVANTAGES

It will be manifest that this method creates in the patient an entirely different mental attitude toward the denture problem; for the change from the natural to the artificial is made rather easily, opinion to the contrary notwithstanding. It is the easiest way to establish denture

tolerance. The patient becomes accustomed to the new situation in a comparatively short time. There is less probability that he will either neglect or refuse entirely to learn to wear his new dentures. Furthermore, the insertion is made while there is still anesthesia, and a soothing medicament can be placed between the tissues operated on and the new denture. This period without any teeth, either natural or artificial, which usually lasts from a few weeks to several months, causes extreme embarrassment, and unnecessary loss of time. The patient frequently becomes fretful and discouraged. No doubt, multitudes who, for reasons of health, should have all the teeth removed refrain from the ordeal owing to the dread of dentures and the humiliation incident to their construction. It is a needless hardship to all who face the possibilities associated with their first dentures and an injustice to those who can afford and who desire this added service.

The proponents of this type of work claim for it better physiologic results. The form of the ridge is largely predetermined, thus insuring a more favorable denture-bearing area for subsequent work. There is less postoperative pain. Healing is more rapid. The blood clot is supported. Subsequent hemorrhage is prevented. Dry sockets are reduced to the vanishing point. The alveoli and soft tissues are protected against trauma and outside irritants such as tongue and muscle movements and the passage of air and food. With suitable substitutes for natural teeth, masticatory function is never entirely lost. The alveolar processes are designed to sustain natural teeth, often under rather heavy pressure; the muscles of mastication, to apply this force. When thrown out of function during an edentulous period, neither bone nor muscles can maintain normal tone, and hence tend to atrophy. Dentures are the best artificial substitutes that have yet been devised to maintain this biologic function of bone and muscle tissue. When a splint in the form of a properly fitting denture is placed immediately upon ridges freshly operated on, there is said to be less resorption and greater density of the ridge, because the intermittent and light pressure on these healing tissues, resulting from masticatory movements and, acting as a mild counterirritant, produces condensation of bone; whereas, our past experience has confirmed the fact that constant hard pressure causes bone resorption.

By this technic, not only is the disfiguring period of no teeth at all avoided, but also the end-results are more in accord with esthetic requirements. The patient escapes the embarrassment of looking prematurely old. There is less of the "false teeth" effect; for, by this process, the porcelain teeth can be oriented in the exact position of the natural teeth, with the vertical facial dimension preserved; a result which is all but impossible with the older method of denture construction. Conspicuous abnormalities of tooth form, color, position and arrangement are so modified that characteristic individuality remains, but abnormalities are reduced as requirements seem to indicate.

Moreover, a period without any teeth is abnormal. During this stage, there is muscular fatigue, with the probability that an entirely different muscular tension will be established which must later be overcome or readjusted. The patient acquires unusual habits of speech and mastication, which must also be corrected. Power of expression is impaired. The cheeks fall in, the lips shorten and thicken and the tongue widens. It becomes extremely uncomfortable for the patient, and difficult for the dentist, after an edentulous interval, to restore exactly the

lost proportions and normal functions. The mandible, having no rest position, is virtually in a strained or dislocated condition. With teeth on only one jaw, there is the constant hazard of trauma to the opposing ridge. Excessive jaw closure is a factor in defective hearing.

We have gone through the years assuming that our patients must be deprived of all teeth, often for months, as a concomitant of full denture service; not recognizing that our orthodox procedure has been an unnecessarily embarrassing mental hazard to the patient, that it is not physiologic, esthetic or normal and that it represents a condition which, with our present skill, no longer need be tolerated.

OBJECTIONS

The disadvantages are probably more theoretical than practical. Possibly one objection would be the added cost, due to the unusual care and precision required of both prosthodontist and surgeon. The latter, in preparing the mouth, has to work to a predetermined mouth form. He meets unforeseen obstacles, such as the necessity of removing more tissue than was anticipated, owing to infection, tooth fracture during operation or inadvertent removal of bony plate along with certain teeth. The prosthodontist, not being able to try his work in the mouth to verify certain aspects, must use extreme care to check and recheck by other methods.

There should be no greater danger of infection from this method than from the older method of postoperative care. There could easily be less possibility of infection if an antiseptic drug is applied in connection with what is in effect a splint. The offensive odor under an appliance left in place for several days upon ridges freshly operated on, without antiseptic or prophylactic precaution, has been mentioned elsewhere. This undesirable feature can and should be eliminated.

The objection has been raised that this service requires the joint skill of specialists in both oral surgery and denture prosthesis. Even were this true, it represents a worthy service, which would thus doubtless be maintained on a superior level of workmanship; but the combined requirements for successful immediate replacements are rather often found in one man, and they are not beyond the capabilities of many conscientious operators.

The criticism in regard to traumatization of the mouth and extensive destruction of bone and soft tissue during surgical preparation is not made without justification. This should be an ambulatory service, and to the extent the patient is disfigured needlessly, even though temporarily, or confined to his home unnecessarily, to that extent the operator departs from an ideal.

With all the precautions that it is possible to take, absolutely aseptic oral operations are impossible of attainment. In covering a mouth wound, whether sutured or not, with a dental splint which admittedly encompasses an area that is not sterile, and in not being able to establish free and adequate drainage, we are violating a basic principle of surgery. The only effective answer, as made by a nationally known prosthodontist, is that, in actual practice, it works.

The necessity for multiple extraction, in at least one area of the mouth, may, in some instances, be cited as an objection.

CONTRAINDICATION

In general, it may be stated that any physical condition of the patient which will make extensive mouth preparation seem ill-advised is a contraindication for immediate denture service. This includes such considerations as advanced age, debility and certain heart lesions. The work

should not be undertaken in the presence of acute infections, such as abscesses or Vincent's infection. Known tendencies toward extensive hemorrhage and excessive gagging should be corrected before a service such as is here contemplated is attempted. Patients who cannot appreciate or do not show an interest in or a willingness to pay for the added advantages offered must manifestly be served in the routine way.

STANDARDS

We are here considering a "de luxe" denture procedure. Owing to the advantages offered, it should be made available to all who desire it and are willing to pay for the added time and skill involved. Immediate denture service of an adequate standard of quality cannot be maintained at a low fee. Unfortunately, the whole scope of dental technic lends itself to slovenly practice, and this art could conceivably fall under the exploitation of the charlatan, an outcome which would be nothing less than tragic. Another unfortunate eventuality for both the profession and the laity would be to have it undertaken by indifferent and incompetent workmen, as this would lower the standard of dentistry as a worthy profession and would hold out high hopes to the recipients of what could otherwise be a superior service. Yet it need not be confined to specialists. Any one with a background of successful practice in full denture prosthesis and surgical preparation of the mouth for full dentures, and who is sincere in his efforts to give his patients the best of which he is capable, can and should develop the necessary technic. There can be no objection to combining the skill of two operators in one case.

SUMMARY

Immediate denture service consists of delivering one or both artificial dentures when the last of the natural teeth are extracted. It is not a new procedure except in the refinements that are now applied to the practice. The existing literature is limited in amount and often inadequate in treatment. There is general agreement that the procedure is practical, that the benefits to the patient are numerous and that better ultimate results can be attained. These results and advantages should be made available to those patients who desire them and are able to pay for the added service. There is a diversity of opinion as to the technic to be employed, from both the surgical and the prosthetic aspects. The objections offered, while not great, should not be ignored.

Further study and mutual exchange of ideas will no doubt eliminate most or all disadvantages, as well as improve the technic involved. The aspect of particular interest is that we have gone through the years assuming that the edentulous period was a prerequisite of full denture service, not realizing that our routine practice has imposed on many patients an injustice which, with our present knowledge and skill, need not be tolerated.

1006 Security National Bank Building.

DENTAL VISUAL EDUCATION

By GEORGE B. WINTER, D.D.S., St. Louis, Mo.

THE sound motion-picture is a new development whose value as a means of instruction should be more widely recognized by dentistry. There is some reason to suspect that gaining full acceptance of motion-pictures as an effective medium for professional training is retarded, to some extent at least, by the fear that, if encouraged, they will come to supplant the presentation by the instructor or clinician in person.

What ground is there for fearing that instructional sound-pictures will displace the lecturer in the classroom, the clinician or even the textbook? At the outset, it may clear the atmosphere to state definitely that *if* the new scientific sound motion-pictures provide a more effective technic than methods formerly used and take their place in an entirely adequate manner, they should do so. The point is that the most valuable and effective medium should prevail. We cannot do otherwise than desire this, because, after all, our sole objective is to further the spread of knowledge, and we must not let prejudices or personal advantage influence us. Those who lose by change must be prepared to make the sacrifices which this involves. Change always claims victims.

The fact is, however, that the need for books, lecturers and clinicians to perform the functions of instruction should in no way be lessened by the introduction of scientific sound motion-pictures as a means for professional training. They add one new medium for instruction which, instead of replacing any medium now being used, enlarges educational possibilities in a way not yet fully realized.

There should be a wider knowledge of what can and cannot be done in instruction by sound motion-pictures. Just what can be done? Our experience has made us very pleased with the possibilities. We knew that it was possible to present x-ray pictures and diagrams more clearly and effectively and with greater economy of time on a screen than by passing them about or placing them by any other means before members of a group at one time. However, this is but one of the things that can be done by motion-pictures.

In fact, sound-pictures are probably more effective than personal presentations by an instructor to a single individual or a small group, because the presentation has been carefully planned, prepared and revised so that it is as nearly perfect as possible. Any one with experience in making a personal presentation to an individual or a group knows that lapses may occur, no matter what his skill or experience. Afterward he will think of things which he should have said. Fatigue, external conditions or other factors may sometimes interfere with his doing his best work, but the picture, once made, will function uniformly under all circumstances.

There is a very great advantage in being able to give the explanation at the same time that the illustration is shown. In the presentation of some complicated matter by motion-pictures, the explana-

tion may be simplified by showing, first, a chart or diagram which makes clear what is to be looked for, say, in examination of an x-ray picture; then, showing the picture, using a pointer to direct attention to the features of interest. The possibility of doing this makes the motion-picture a medium of instruction of great utility and value. Its full possibilities have not yet been realized in any field to which this technic has been applied. We believe that this is particularly true of the animated chart or diagram, whose potential value for simplifying the explanation of complicated technic in preparation for understanding clinical presentations and actual participation, later, in operative procedure is limited only by ability, ingenuity and skill in devising them.

Methods of instruction should utilize the scientific knowledge of how people learn, which has been gained through psychological investigations. These facts are the basis of the progressive methods being used in many fields of education, general perhaps more than professional. Psychological research has shown that some people learn more effectively from reading than hearing; others, from seeing. The most effective method for teaching groups, it has been found, is to supplement printed and verbal explanations with pictorial representations and presentation of concrete objects.

The perfect explanation, the one by which the highest possible degree of learning of the matter being presented can be effected, is by a union of verbal, written and pictorial representations so that they complement each other. Now that scientists have discovered this, educators have the problem of devising instructional plans which combine these elements. We believe that an almost perfect combination has been attained in the sound motion-picture, supplemented by the textbook and the work of the lecturer or clinician, for more detailed explanations, assistance with difficult points and review. On the basis of our work with sound motion-pictures and their reception, we are almost ready to go so far as to say that if only one of these mediums of instruction were to be available, the sound motion-picture would be our choice.

Scientific investigations of the learning process show that one learns best how to do by doing. However, in learning the skill needed to care for human health as a member of one of the healing professions, where, instead of having raw material with only a dollars-and-cents value to practise upon, it must be one's fellow man, it is necessary to obtain as much knowledge as possible in advance of attempting operative procedure, which is to be done by seeing and hearing. The sound motion-picture affords a most valuable medium for doing this, and we believe that viewing it should precede clinical observation.

It supplements rather than replaces the textbook. The student reads and studies his book. What he gains from this depends upon his skill in reading and capacity to give concrete and tangible reality in his mind to the facts and procedures described. The sound-film accomplishes this—bringing the printed page to life, one might say. The span of attention in reading, that is, the length of time that an individual can give the printed page his full attention and gain a vivid and lasting knowledge of its contents, is limited. Some have a greater capacity than others. The span of attention to visual and verbal presentations, whether made by an individual personally or through a sound-picture, is much greater for nearly every one. Most people, of course, have greater experience in attending to verbal and visual presenta-

tions than to written. Even a scholar spends but a relatively small proportion of his day in reading, whereas one is seeing and hearing during every waking hour. The sound-picture for professional training puts this experience to good use.

After the sound-picture has taken the printed page and brought the technical procedures thereon to life for the student, he can turn again to his textbook to clear up certain points which he has not grasped fully and to answer certain questions that have arisen in his mind. In many instances, we have been informed by a student that he was surprised to find how much more the printed page meant to him and how much easier he could grasp the principles and technics when he returned to it after seeing the picture. Some objections to sound motion-pictures as a means of instruction are doubtless based on the false assumption that they are intended to supplant the text. Not at all—rather to supplement it, a function which, we believe, they will be found to perform excellently.

What are the disadvantages of sound motion-pictures as an instruction medium? One objection which has been expressed is that pictures are not scientifically accurate. We believe that they can be made so. It must be admitted that sound-picture technic is not a simple and easy matter. One can hardly expect to develop accurate, effective pictures if he does not give considerable thought and his best efforts to their preparation and enlist the assistance of technical experts of the motion-picture field. As much, sometimes more, time, thought and effort must be given to the preparation of a scientific sound-picture as to a scientific textbook on the same subject.

Doubtless some of the difficulty in obtaining serious consideration of the sound-picture is the result of viewing pictures which have been made by amateurs who lacked a realization of the problems and difficulties of motion-picture technic. Although their material may have possessed great intrinsic value, this was obscured by a presentation which did not do it justice. Of course, in such a case there are many who think that the reason for failure is that sound-pictures are inadequate, whereas the truth is rather that the maker of the picture had an inadequate knowledge of the possibilities of the medium and needed skilled technical assistance.

Indeed, one might go so far as to say that for the person with no experience or special knowledge of motion-picture technic to attempt to make sound motion-pictures of real scientific value, not merely for the amusement of himself and his family or friends, is as little likely to be successful as for the same man to attempt to handle the work done ordinarily by the editor and printer in the publication of a book he has written. Technically, trained assistance is needed in each case, even though there may be a few outstanding examples of good scientific sound-pictures which have been made by individuals without the cooperation of skilled members of the motion-picture profession. However, the dentist, as a professional man, should recognize the importance of the work of the professional man in any field.

A barrier to the use of sound motion-pictures in instruction is the expense involved. The cost of publishing textbooks is usually recovered through sale of the books, with the publisher commonly granting a royalty to the author. However, rarely is a return realized from showing sound motion-pictures for instruction purposes which offsets the expenses incurred. The cost of making a scientific, worth-while picture of feature length is comparable to that of publishing a scientific textbook. Obviously, profes-

sional men are not able to bear the entire burden, whatever may be their eagerness to further the spread of knowledge. It is the greater because the scope of a picture of feature length is approximately comparable to that of one or two chapters of a textbook, so that a series of motion pictures is needed for extensive treatment of a subject.

The problem can be met by turning distribution of the film over to the motion-picture concern which handles the technical details of its preparation. Obviously, the practising dentist is not in a position to give the time necessary to bring a film to the attention of those for whom it is intended, or to see to its shipment, return, the making of any repairs needed after use and other similar details. These matters should be handled by an organization prepared to do such work and experienced in doing it, and to which adequate compensation should be given. The bill for rental of films properly includes a charge to cover this and an additional charge which goes to reimburse the organization for services in connection with the making of the picture. In addition, the author should receive a royalty, as do publishers of textbooks.

The trouble is that the amount to be realized from a charge for film rentals cannot, under present conditions, offset fully the cost of making the picture, because the field for showing it is limited and the funds of those who should see it permit the payment of only a small fee, if any. Renting a film is often considered to be incurring unnecessary expense. While individuals and institutions buy scientific books, they expect to view scientific films free.

If sound motion-pictures are to assume their proper place in the field of education, arrangements must be worked out to finance their making. Possibly the problem can be met by endowments or establishment of funds for production of needed scientific pictures. Education would gain greatly if the need for this were realized and met. Schools should develop libraries of sound motion-pictures, which some day may be considered as important as libraries of textbooks. Scientific sound-pictures are also needed for postgraduate instruction, to keep professional men up-to-date in technical procedure. They have an important place on the programs of professional societies and in plans for clinical training.

One of their most important fields is for individual instruction, especially in remote communities, where the professional man does not have the opportunities of the practitioner in large communities to associate with his fellows, come in contact with great medical institutions and keep in touch with progress. Motion-pictures are especially valuable for simplifying instruction in complicated technics, supplementing rather than supplanting the study of texts, attendance at lectures and clinics and actual practice in procedures.

They permit any one who has a special technic to demonstrate to give a personalized presentation in many different places at the same time, greatly multiplying or amplifying the teacher's sphere of influence. He can rest secure in the knowledge that he is giving his best possible presentation each time, whereas if he appeared personally as an essayist or clinician, fatigue from travel, distraction of his attention or unfavorable conditions in the room where he was making his presentation might prevent him from doing his best work. Besides, the busy professional man makes considerable personal sacrifice in adding public appearances to an already heavy schedule. If he has once committed his presentation to reels of film, they can make his presen-

tations and he can devote his time to his professional duties, research and other matters. The professional man who may find that he is called upon to do more than he can possibly accomplish when he must appear as an essayist or clinician, in addition to his other duties, will find the sound-on-film motion-picture a valuable means of doing what psychologists call "multiplying his personality."

It must be kept in mind that those making scientific motion-pictures have an obligation to the public to present only material of scientific value, according to scientific principles, and in a manner which is at the same time accurate, instructive and interesting. Any work in this, as in any other scientific field, must justify its existence by presenting needed information in the most effective way that it has been possible to develop, supplementing information already possessed. It must be of public benefit. There is a great deal of material in our field which should be presented in sound motion-picture films that would be to the advantage of the profession today and tomorrow. It is hoped that dentistry will not long continue to lag behind medicine in making use of this valuable new medium for instruction.

Frisco Building.

CHANCRE OF THE GINGIVAE: REVIEW OF THE LITERATURE SINCE 1921; REPORT OF A CASE

By FLOYD E. STRAITH, D.D.S., Detroit, Mich.

HISTORY

MEDICAL and dental literature in the English language seldom mentions, in discussion of lesions of the mouth or of syphilis, the possibility of primary chancre of the gum. The rarity of its occurrence and the paucity of its mention in medical records have generally resulted in delayed recognition, diagnosis and treatment, with a greatly increased potentiality for multiple direct or indirect contacts during its highly infectious stage.

While the earliest mention of primary chancre of the gum is credited by Thouvenot[1] to Astruc, in 1736, it undoubtedly has occurred since the first years of syphilis.

STATISTICS

The percentage of extragenital chancres in relation to total number of chancres varies according to the different reports. Fournier[2] reported them as between 8 and 9 per cent; while the more recent statistics of Chabrol[3] give a slightly lower percentage of 6.5. Of the extragenital lesions, Chabrol[3] credits 79.3 per cent to the head, 70.1 per cent to the mouth and 1.1 per cent to the gingivae. Schwarzkopf,[4] in 1930, reports 407 extragenital chancres, 297 of the lips and mouth, or 72 per cent, and 6 of the gingivae, or 1.4 per cent.

Klauder,[5] in 1921, brought the number of cases reported in the medical literature of the world up to 113, including his personal case report. Since that time, there have been only forty-two additional cases reported, bringing the present total to one hundred and fifty-five. Of these forty-two cases, only two were reported in the English literature.

ETIOLOGY

The etiology of primary chancre of the gum tissue is widely varied, but many undoubtedly are due to sexual perversion. Infection from dental and medical instruments, pipes, cigars, toothbrushes, cups, drinking and eating utensils, toothpicks, mouth bellows and other secondary contacts is commonly reported. Many cases have appeared after extraction. One of the most unusual cases recently reported was that of Gravagna,[6] in which the brother of a married woman requested her to nurse his child, which apparently had a mouth lesion. The woman developed a chancre of the nipple, her 14-months-old baby, a chancre of the anterior gum tissue and her 3-year-old child a chancre of the tongue.

or, rarely, three or more teeth may be involved. (Fig. 1.)

The most frequent site of the lesion is about the upper incisors. The lower incisors are occasionally involved and, still less frequently, the posterior teeth. In fact, in the recent literature, only one case (that of Hoffmann[7]) has been reported buccally to the lower left third molar.

Primary chancre of the gum tissue is found predominantly on the buccal or labial surface of the gingiva, and rarely on the palatal, and is generally adjacent to the teeth. If the lesion progresses, the surface may become ulcerated and covered by a grayish pseudomembrane. The base, instead of being level with the surrounding tissues, may become raised or papular. (Fig. 2.) Rarely, the center

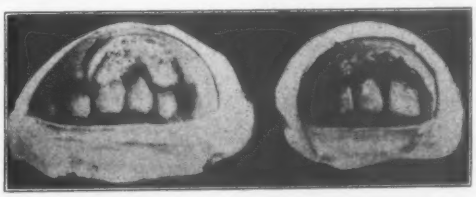

Fig. 1.—Moulages of chancre of gum in St. Louis Hospital, Paris. (From Miquel's thesis.)

The classification of primary chancre of the gum tissue and its symptomatology as given by Fournier, in 1897, is still generally accepted. He divides the lesions into typical and atypical forms.

The typical form is more characteristic of a primary chancre elsewhere, consisting of an erosive, ulcerative lesion, well limited, but without clearly defined borders. The surface is glossy and smooth and the color of raw beef, or carmine. Induration may or may not be present. The area of the lesion is generally small, varying from a few millimeters to from 2 to 3 cm. It is very often crescentic or of half-moon shape, with the concavity directed toward the necks of the adjacent teeth. The gingival margins of one, two may become necrotic and of a slate or violet hue. (Fig. 3.)

The atypical form may appear as a simple gum lesion with no especial characteristics. It is erosive more often than ulcerous, with indefinite borders, and the surface may be granular, lobulated, raised or papular, and may vary from carmine to multicolor. The affected gums may recede, the roots being exposed, with loosening of the teeth and even sequestration. There is usually a bloody purulent exudate.

Pain is rare or slight except when the lesion is irritated by the contact of food or drink.

The gum tissue chancre is, in all cases reported, restricted to a single lesion. The

gingival lesion may be coincidental with others elsewhere on the body.

Predominantly characteristic of primary chancre of the gum tissue, as with chancres elsewhere, is the regional adenopathy. This painless swelling of the adjacent lymph glands should suggest to the diagnostician immediately the possibility of syphilis and may often prove to be the salient clinical diagnostic feature.

In the early stages of the lesion, only one gland may be involved, with later swelling of other glands in the area; or only the first single gland may persist. The usual site is the submaxillary region, particularly below the angle of the mandible; but the submental and the pre-auricular may also be involved. The size of

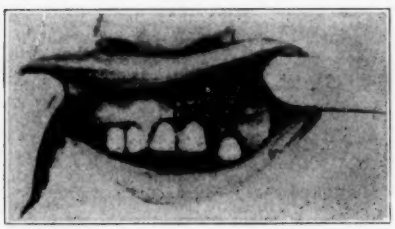

Fig. 2.—Chancre of gum; showing raised lobulated surface of lesion. (Klauder's case.)

the glands may vary from that of a hazelnut to that of a walnut. They are hard, immovable and painless and may constitute the complaint which prompted the patient to seek advice. This glandular adenopathy may be unilateral or bilateral.

The general symptoms are mild, usually being restricted to slight sore throat, occipital headache, slight malaise and possibly a slight elevation of temperature.

In differential diagnosis, the lesion must be distinguished from other ulcerative gingival lesions, infections, abrasions, tumors and chemical and thermal trauma. The following characteristics of primary chancre of the gum tissue are so predominant that little difficulty should be experienced in the diagnosis of at least the typical form of lesion: (1) Rapid development of the lesion as contrasted with chronic or other affectations of the gum tissues; (2) persistence of the lesion; (3) limitation or lack of spreading, and (4) the presence of typical regional adenopathy in all cases.

Dark-field examination will prove of decided diagnostic value, particularly in the typical form. While diagnosis is more difficult in the atypical form, owing to contamination by other oral spirochetes, a competent laboratory technician familiar with such examinations will be able to distinguish *Spirochaeta pallida* from the other organisms. Repeated Wassermann or Kahn tests should be performed

Fig. 3.—Chancre of gum; showing crescentic area of erosion.

in all suspected cases to confirm the diagnosis. A negative first report should not be accepted as final.

TREATMENT

Treatment of the condition should be solely of a specific type, with no topical treatment of the primary lesion. The lesion will heal rapidly under intravenous therapy, with little scar-tissue formation.

Perusal of the literature emphasizes the need for more general visual education of both medical and dental students and practitioners in the characteristics of primary chancre of the gingiva. Many of the cases reported were not definitely

diagnosed until the secondary lesions appeared, with resultant increased potentialities for wide-spread contagion. This is particularly true of the following personal case report.

REPORT OF CASE

Nov. 17, 1933, an Italian boy, aged 7 years, was referred to my office by a physician for examination and diagnosis. He was accompanied by an older sister, who acted as interpreter. One month before, he had developed a painless swelling beneath each angle of the mandible accompanied by slight sore throat. Several days later, the parents noticed that the gum tissue over the upper left central incisor was swollen and inflamed. It was not particularly painful. There was no history of a fall or other local injury. During the interval since that date, the patient had been examined by three dentists and two physicians. The last physician consulted considered the possibility of syphilis.

Fig. 4.—Lesion of gum; showing rhagades at corners of lips and bilateral submaxillary buboes. (Author's case.)

EXAMINATION

The patient was a bright active child. Examination revealed a marked bilateral submaxillary painless swelling, indurated and non-fluctuating. (Fig. 4.)

There was swollen, beef-red gum tissue over the left central incisor from the midline to the distal aspect of the lateral incisor, with no sharply defined border. A raised ulcerated area was present at the free margin of the gum tissue over the distal half of the central incisor from which could be expressed a slight amount of mucopurulent exudate. The lesion was not particularly painful on pressure.

On examination of the skin, a generalized copper-colored macular rash was present except for the normally exposed surfaces, particularly on the arms and chest. (Fig. 5.)

Dark-field examination of material from the ulcerated area was positive for *Spirochaeta pallida.* The Wassermann and Kahn reactions were positive. The patient was placed under antisyphilitic treatment, rapid disappearance of the lesion resulting. The case was reported to the board of health. Their investigators made Wassermann tests of the other twelve members of the family, all of which were negative.

Fig. 5.—Appearance of patient; showing macular secondary eruption on forearms and submaxillary buboes. (Author's case.)

As in many other cases of primary extragenital chancres, the mode of infection in this case remains unknown but, in consideration of the patient's age, the lesion was probably innocently acquired.

SUMMARY

1. Primary chancre of the gum tissue is not common, but yet not rare.

2. It may be much more frequent than is evidenced by the literature owing to lack of recognition.

3. It may occur at any age.

4. It is frequently innocently acquired.

5. The painless, persistent, non-spreading lesion, associated with painless regional adenopathy and positive dark-field, Kahn and Wassermann tests affords a conclusive diagnosis.

6. The case reported illustrates the need for earlier recognition if multiple contagious contacts are to be prevented.

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A COMPARATIVE ANALYSIS OF MASTICATORY FUNCTION AND ITS RELATION TO DENTAL DISEASE IN ANCIENT AND IN MODERN MAN

By MEYER KLATSKY, D.D.S., New York City

THE deplorable failure encountered by the dental profession in solving its most urgent problems of caries and periodontoclasia is evoking much discontent and adverse criticism. The major part of the blame for this lack of success is being laid at the door of the dental investigator, being attributed to his inadequate and ineffective methods of carrying on research. Many in the profession believe that, if its scientific problems are ever to be satisfactorily solved, it will be not by laboratory experimentation, which is very much in vogue of late, but by keener clinical observation and more active research in the human mouth. These sentiments were eloquently expressed by J. L. T. Appleton in his address before the Thirteenth General Meeting of the International Association for Dental Research, when he said:

> I would like to see more clinical research undertaken. Too many clinicians unfortunately labor under the illusion that scientific research is a thing of the test-tubes, balances, incubators, microscopes and microtomes. This belief deters too many clinicians from really developing their talents and from taking advantage of their opportunities. It is erroneous and harmful.

Attention is also being called to the fact that our scientific studies are not broad enough, that they are limited in scope and that certain sciences which should enlighten and guide us in research do not receive enough attention or are being entirely overlooked by certain investigators. This has been pointed out to us by Stillman,[1] who said:

> The present existing sciences of dentistry, which are its very own, are dental anatomy and dental pathology. These two sciences are established; they exist. Those yet to be born are dental physiology and dental hygiene.[1] . . . Most dentists have conceived this new dental pathology to be a "working" science within the healing art. They little realize the obvious fact that dental pathology cannot be wholly understood unless there first exists in the mind a comparison of the principles of physiology, from which will develop an ability to interpret pathology. Pathology is a study of disease and disease cannot be understood unless based on the definition of disease. Disease signifies a condition of physical disorder. It is a disturbed or abnormal physiological action in the living organism; which connotes a morbid condition resulting from such disturbances. Disease implies physical uneasiness, *dis*-ease.[2]

Clear undertsanding of dental physiology is of paramount importance to the dental practitioner, and is indispensable to the dental investigator if he is to understand the nature and cause of pathologic conditions in the mouth. He must be able to differentiate between the normal and the abnormal, the healthy and the diseased. It is of absolute necessity to know the proper function of the teeth

and the other masticatory organs, such as the jaw bones and the muscles, involved in the act of mastication. Function is of the greatest significance in the living body; our very lives depend on function. We cease to live when the vital organs cease to function. When a living organ functions properly, that organ is in a normal state of health; when function is interfered with, the organ becomes abnormal or diseased.

The dental profession, which is standing aghast wondering why we suffer more from caries and periodontoclasia now than ever before, why we are confronted by pathologic dental conditions to which our ancestors were more or less immune, could be aided greatly in the solution of this most baffling problem by an analytic study of masticatory function and its relation to dental disease in the mouth of ancient man as compared with that of modern man.

Fig. 1.—Skulls of prehistoric men. Left to right: Pithecanthropus erectus, Piltdown Man, Neanderthal Man, Cro-Magnon Man. (Restorations by J. H. McGregor. This and the following illustrations are presented through the courtesy of the American Museum of Natural History, New York City.)

THE MASTICATORY APPARATUS OF ANCIENT AND PREHISTORIC MAN AS COMPARED WITH THAT OF MODERN AND CIVILIZED RACES

The masticatory organs of ancient and primitive man were in a state of development much superior, both anatomically and physiologically, to those of modern, civilized man. The teeth, palate, jaw bones and the muscles involved in the act of mastication were in primitive man larger, stronger and of better function than those of modern races. The anatomic and physiologic state of the masticatory organs depends on the physical character of the food used by the individual for his daily subsistence. This statement was made a long time ago by no less an authority than Herbert Spencer,[3] and was later confirmed by the great Charles Darwin.[4] The manner of preparing food, in turn, depends on the stage reached by the individual in the process of evolution. The celebrated anthropologist, Sir Arthur Keith, writes:

In the evolution of the early ancestral form of man from an anthropoid type, the palate, jaws, teeth, and other parts concerned in mastication appear to have undergone retrogression, as the brain became a larger and more efficient organ. The brain, by its invention, saved the labor of the jaws. The area of the palate may be taken as an index of the extent to which the masticatory system is developed. The capacity of the cranial cavity of the skull serves as a rough index of the brain power.[5] . . . It has come about in the course of man's evolution that the powers of the brain have increased while the parts concerned in mastication have been reduced.[6]

Primitive man, whose brain power was poorly developed, did not know the art of

cooking and preparing foods and so had to consume them in a raw, crude and coarse state, which necessitated harder and more vigorous chewing and contributed to the high degree of development of the masticatory apparatus. On the other hand, modern man, with his highly developed brain power, uses great ingenuity in preparing and synthesizing his food into soft, resistless form, thus obviating chewing and no longer requiring a highly developed masticatory musculature. Hence, the masticatory organs are constantly becoming weaker and failing of their function.

All information and conclusions drawn about ancient man are based upon studies of skeletal collections. Thousands of such skeletons, which are from time to time being disinterred at various parts of the globe, are being preserved for scientific study. While skeletal collections consist only of the bones of the body, the soft parts having disintegrated, by an intelligent application of scientific knowledge, the anthropologist and archeologist can easily determine the anatomic and physiologic state not only of the bones, but also of the muscles, and the manner of their function. We know that bone is dominated by muscular action, that the size and shape of bones are decided by the size and action of the muscles which are attached to and which act on those bones. Mackenzie[7] writes:

> By means of bones and joints the results of muscular action are produced and adjusted, and the shapes and lengths of bones bear a relation to the motions performed. Bone is dominated by muscular function, for that it is called into being, with the disappearance of that necessity so also disappears the bone. Of its subservience to muscle there are numerous instances scattered throughout the animal world. Where extensive muscular attachment is required we have a broadening of the bony surface, and a narrowing or rotundity where such attachment is diminished; compactness or lightness of bone where strength or otherwise is required; and bony ridges and projections to afford leverage.

Therefore, we can determine what musculature was involved in the function of mastication from an examination of an ancient skull from the particular characteristics of the bones to which those muscles had been attached during life. The general construction of the skull, the size and shape of the bones and the manner of their articulation, the particular characteristics of the various fossae, ridges, fissures and crests—all these convey to us a wealth of information regarding the particular individual or race.

Fig. 2.—Left to right: Heidelberg jaw, jaw of chimpanzee and jaw of modern man. There is a great difference in size and development between the Heidelberg jaw and that of modern man. The incisal and occlusal surfaces of the Heidelberg teeth are markedly flattened as compared with the surfaces of the teeth of modern man with their distinct cusps.

Evidence gathered from studies of skulls of ancient and prehistoric man leads to the conclusion that the musculature of these races was of the highest and most developed state, and functioned most vigorously and effectively. Leigh,[8] who examined a collection of ancient Egyptian skulls, found that "there are rather high, distinct temporal crests, which indicate a fairly well-developed masticatory musculature." In describing the La Quina Skull, Hrdlička[9] says: ". . . the temporal fossae were spacious, for the accommodation of powerful temporal muscles. . . ." Statements of this sort are to be found in abundance in descriptions of ancient skulls by various anthropologists. All evidence gathered from these studies indicates the far greater superiority of the masticatory apparatus

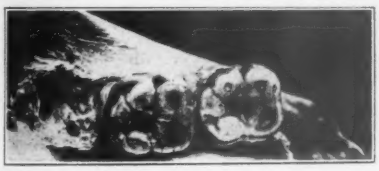

Fig. 3.—Molar teeth of Piltdown mandible, showing attrition on occlusal surfaces.

of ancient man to those of modern, civilized races.

But a still better and more nearly accurate method of determining the manner of function of the masticatory organs of primitive man is examination of his teeth to ascertain the amount of attrition registered on their incisal and occlusal surfaces.

DENTAL ATTRITION

Dental attrition, as defined by Leigh, is the gradual wearing away of the hard parts of the teeth through the physical and physiologic agencies of mastication of food. There are two conditions that determine the amount of attrition of the teeth; namely, the physical state of the food eaten and the amount of stress exerted on the teeth in the process of mastication. The latter is determined in large measure by the former; *i.e.*, the adequate mastication of hard, raw and bulky foods requires greater stress and so demands of the masticatory organs more vigorous function than for cooked, refined and soft foods. Individuals who eat natural foods show a greater amount of wear of the teeth than those who subsist on modern foods. Therefore, it is natural to find more attrition in the teeth of ancient and primitive races than in those of modern man. Professor Shaw says[10]:

Fig. 4.—Cast of Galley Hill skull, showing attrition of occlusal surfaces of bicuspids and molars.

Examine the teeth of a native living under natural conditions, or, better still, go into some museum and examine the dentitions of the skulls of fossil or semi-fossilized or even semi-civilized people, and then examine the dentition of a modern European. In the first case, you will find the enamel of the teeth on the occlusal surface completely worn away if middle life has been reached, and practically every trace of fissure obliterated. In the latter case, if the dentition is of similar age, the tips of the cusps may be slightly worn, but the fissures are as they were when the

teeth erupted, and many of them have fillings in them. If by chance you do come across a European of advanced years with no decay, the wear of the teeth will show a striking resemblance to those of a native.

The fossil teeth of Pithecanthropus erectus, Homo heidelbergensis and Eoanthropus dawsonii, believed to be the first ancestors of man, show a marked degree of attrition, some of them being completely worn down and flattened, with complete obliteration of cusps and fis-

Fig. 5.—Neanderthal jaw; showing flattened condition of incisal and occlusal surfaces of teeth due to attrition.

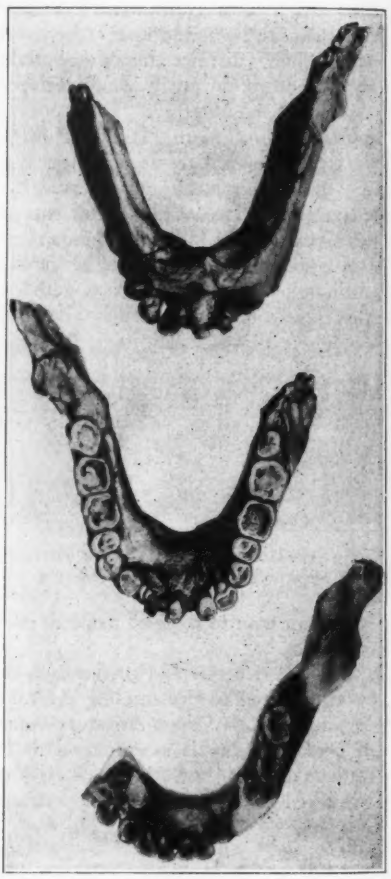

Fig. 6.—Neanderthal jaw. The pulp exposure in some of the teeth is due to excessive attrition.

sures. The same is true of the fossil teeth of the cave men, such as Homo neanderthalensis, Homo rhodesiensis and Homo sapiens.

Mummery[11] says of a "portion of the mandible of a child of about five years of age of the Neolithic or Late Stone Age from the British barrow": "There is a marked attrition of the deciduous molars, showing that they were used in the mastication of hard resistant food, and the development of the muscles of the jaw is associated with a strongly developed ascending ramus with an angle closely approaching that of the adult mandible."

Smyth[12] records the following on an examination of the Bidford-on-Avon Collection of Sixth Century Saxon Skulls:

> The most striking feature of the collection as a whole is the great amount of attrition of the teeth. It is, of course, not a rare condition in ancient skulls, and the sites of which the wear occurs are a matter of common knowledge, but it is interesting to note the details as they affect occlusion. Some recognizable degree of attrition is present in every specimen, although in young skulls, in which the third molars are not erupted, the wear is chiefly confined to the first permanent molars. Only eleven specimens can be said to show less than a "medium" amount of wear, in eight cases the degree of wear can be described as very heavy, or "excessive." Third molars may be worn down to flat surfaces.

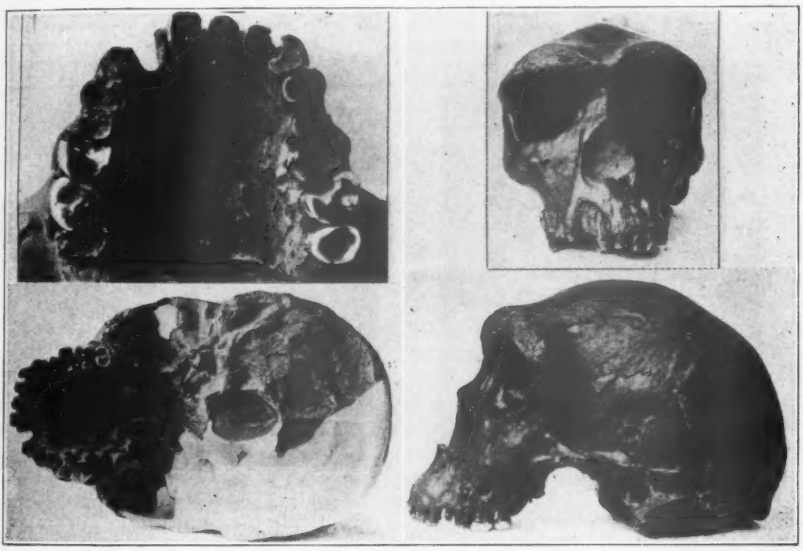

Fig. 7.—Skull, palate and teeth of Rhodesian Man. There is great attrition, with pulp exposure, periapical osteitis, caries and periodontoclasia.

All this authoritative evidence confirms and establishes indisputably the facts that masticatory function was of the highest degree in ancient peoples; that the masticatory apparatus of ancient man was of much superior development, and that dental attrition is characteristic of primitive man, distinguishing his teeth from the teeth of modern races, which show a much lesser degree of attrition.

In the light of these incontrovertible facts, let us see what effect masticatory function, as evidenced by dental attrition, had on the state of health of the mouth and teeth of ancient as compared to modern man.

While most authorities seem to consider dental attrition *per se* as a pathologic lesion, we do not think that it should rightly be classed as such; on the contrary, we find little disease evident in teeth that show signs of wear due to natural physiologic function in the process of mastication. At least, teeth in the first and second degrees of attrition rarely show any symptoms of disease, such as caries or periodontoclasia. Even in teeth in the third degree of attrition, the stage at which the dentin is completely exposed, the pulp being thus endangered, Nature attempts to deposit a new layer of secondary dentin as a protection to the pulp, and the tooth is still in a healthy state. It is only the teeth in the fourth degree of attrition, when the pulp is reached and exposed, that may cause a pathologic condition.

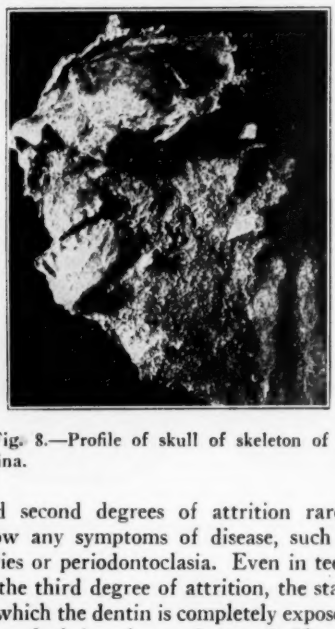

Fig. 8.—Profile of skull of skeleton of La Quina.

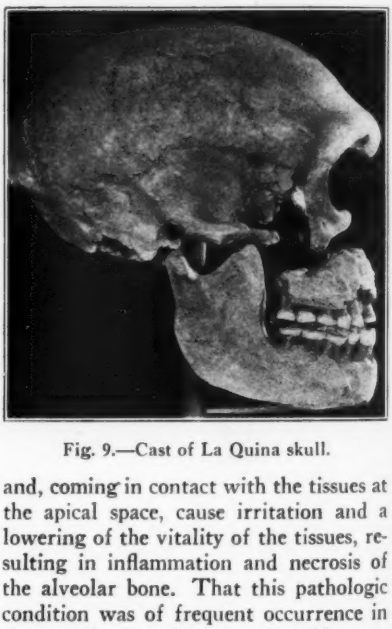

Fig. 9.—Cast of La Quina skull.

PERIAPICAL OSTEITIS

Periapical osteitis, the first and most frequent disease caused directly by pulp exposure, is the inflammation and consequent dissolution of alveolar bone tissue in the region of the apex of an infected tooth. When an injured or exposed pulp remains *in situ* for a certain length of time, the tooth loses its vitality, decomposes and suppurates. The pyogenic micro-organisms and their waste products and the mephitic gases formed as the result of the decomposition of the tissues of the pulp pass through the apical foramen, and, coming in contact with the tissues at the apical space, cause irritation and a lowering of the vitality of the tissues, resulting in inflammation and necrosis of the alveolar bone. That this pathologic condition was of frequent occurrence in the mouth of ancient man is evident on examination of the various skull collections. Unmistakable signs of periapical osteitis are registered on the Halling skull and on the skull of Rhodesian man, as well as on hundreds of skulls of later periods; from which we infer that even ancient man suffered from toothache and

other ravages of dental disease. A point of imperative significance in further studies of dental disease in modern man is the fact that while periapical infection in ancient man was caused by excessive attrition, the result of excessive function, or hyperfunction, of the masticatory apparatus, periapical osteitis in the mouths of modern races is generally due to pulp exposure from deep dental caries, which, in turn, is the result of lack of function, or hypofunction, of the masticatory organs. This leads to consideration of the most frequent modern disease—dental caries.

DENTAL CARIES

It has been glibly asserted by certain authorities that dental caries is a disease entirely confined to the mouth of modern man and to which ancient races were immune, and that primitive man never knew the pangs of toothache. Such statements are erroneous and contrary to fact. Examination of the mouth of ancient man reveals numerous instances of caries, from which races that lived hundreds or thousands of years before had suffered. Even the very ancient Rhodesian man, with enormously strong jaws and big teeth, had suffered severely from dental caries, ten of his sixteen teeth set in the upper jaw showing distinct evidence of this disorder. But close examination reveals that the etiologic factors in caries of the teeth in ancient man were of a distinctly different nature from those of modern races. The first and most striking fact about tooth decay in ancient man, as exemplified in the mouth of the Rhodesian man, is that it occurred only in teeth that had undergone third and fourth degree attrition. The second outstanding fact is that caries in ancient man usually attacked the proximal surfaces of the teeth, in contradistinction to caries in the teeth of modern man, which is seen most commonly on the occlusal surfaces. This leads us to the belief that the most important cause of caries in the teeth of ancient man was the lodgment of food in the interproximal spaces after the teeth had lost the points of contact in the third and fourth stages of dental attrition. In other words, caries was caused indirectly by the use of foods of rough and gritty character and by excessive function, or hyperfunction, of the masticatory apparatus. Caries was not much in evidence in the mouths of young subjects in ancient times because the physical nature of food used in those times and the excessive functioning of the masticatory apparatus served as preventives.

When we turn to modern man, we find that young subjects are the most numerous victims of caries, which is most prevalent in young children. Statistics show that more than 90 per cent of children of preschool age in civilized communities suffer from tooth decay. This disposition to dental decay of teeth of young children can be explained only by the unhygienic state of the teeth caused by lack of exercise and by improper function of the teeth due to modern civilized habits, and by the physical character of the food used by the present-day civilized child. On previous occasions, we[13] showed that the soft synthetic and refined foods consumed by the modern child offer no resistance to the teeth in the process of mastication; which leads to the neglect of the masticatory apparatus. The muscles of mastication remain dormant and lose their tonicity, with consequent lessening of masticatory strain and proper function of the entire masticatory apparatus, including the teeth. With improper function of the teeth, there is always evident an unclean and unhygienic condition of the mouth. The teeth are covered by food débris and become a favorable site for plaque formation and bacterial colonization. With

the acid-forming micro-organisms undisturbed in the same area for some time, the acid dissolves the enamel of the teeth with which it comes in contact, and caries results. So we see that, unlike the condition in the mouth of ancient man, caries in the mouth of modern man is indirectly caused by lack of function, or hypofunction, of the masticatory apparatus.

PERIODONTOCLASIA

What is true of dental caries is true of the other disease that is so prevalent in the mouth of modern man, periodontoclasia, or pyorrhea alveolaris. Without going into the numerous phases of this ailment and all its causes, I shall consider the two most important local factors in pyorrhea, the presence of salivary calculus and traumatic occlusion.

When we speak of traumatic occlusion as a cause of periodontoclasia, we mean the injury caused to the peridental membrane of a tooth when that tooth receives undue strain from the constant pounding by the opposing tooth or teeth if and when all the teeth are in improper alinement or occlusion. Ottolengui's[14] definition of traumatic occlusion is "such contact of the teeth when the jaws are closed that movement of the mandible with the teeth held in tight contact will cause undue stress upon one or more teeth due to a malrelation of the inclined planes." He[15] distinguishes it from functional occlusion, which he defines as "a term that might be adopted to indicate such contact of the teeth when the jaws are closed that movement of the mandible with the teeth held in tight contact, or any normal functional movement of the mandible, will cause no undue stress upon any tooth or teeth."

In ancient times, with excessive function and proper development of the masticatory apparatus, traumatic occlusion was not much in evidence, particularly in the mouths of young persons; hence, the teeth of the young were not subject to periodontoclasia. It was only in the mouths of those persons who had passed middle age and whose teeth had undergone the fourth stage of attrition, resulting in traumatic occlusion, that signs of pyorrhea were evident.

In modern man, periodontoclasia is prevalent at all ages owing to the improper development and great constriction of the jaws, causing crowding and abnormal articulation of the teeth, which lead to traumatic occlusion, which causes pyorrhea.

Such is also the case when we come to consider the next most common cause of periodontoclasia; namely, the presence of salivary calculus. Marshall[16] states that "Riggs (1875) was very emphatic in his opinion that the disorder (pyorrhea) was due entirely to the local irritation of salivary calculus, which was deposited at the necks of the teeth just beneath the free margin of the gum, and extended from there towards the apex of the root, causing inflammation of the gum and the peridental membrane, necrosis of the edge of the alveolus, a discharge of pus and recession of the gums."

Salivary calculus is of common occurrence in all mouths of modern man. There is clinical evidence that a greater accumulation of tartar exists around the necks of the teeth in the mouths of persons who use the softer foods, and whose masticatory apparatus function less, than is the case with those persons who use harder and more detergent foods, and whose teeth function more. Naturally, tartar formation causes more periodontoclasia in modern man than in ancient peoples, whose masticatory apparatus functioned better owing to the use of hard and rough foods. So we see that, not unlike caries, pyorrhea in modern times is caused indirectly by lack of function, or

hypofunction, of the masticatory apparatus.

SUMMARY

1. The study of masticatory function is of paramount importance to the dentist in his study of diseases of the mouth and teeth.

2. A comparison of the mouths of modern men with those of ancient peoples shows that the masticatory apparatus of the former has undergone a great deal of retrogression both anatomically and physiologically. The masticatory organs of the ancients were of greater development and functioned better than those of modern civilized man, owing to his use of cruder, harder and less refined foods in his diet.

3. The extent of function of the masticatory organs of ancient man can easily be determined by an examination of skull collections and collections of teeth of old races, and by observing the amount of attrition registered on those teeth.

4. Attrition is characteristic of the teeth of ancient man, in contradistinction to the teeth of modern people, which show little attrition.

5. The teeth of ancient peoples were not entirely immune to disease, but they were less subject to the ravages of caries and periodontoclasia, because their teeth functioned better, and were kept in a more hygienic state than the teeth of modern times.

6. Hyperfunction of the masticatory organs of old savage races rendered their teeth impervious to the attacks of disease in their youth. When middle-age had been reached, the teeth, having undergone the fourth degree of attrition, in many cases were affected by periapical osteitis, caries and periodontoclasia.

7. Those diseases were the indirect result of the rough character of foods used in those times and of hyperfunction of mastication.

8. Caries and periodontoclasia are more prevalent in the mouth of modern man at all ages owing to lack of function, or hypofunction, of the masticatory organs, brought about by the eating of soft, refined foods, which do not call for exercising the teeth in the process of mastication.

CONCLUSION

We have gone too far in the process of refining and synthesizing foods. While the elimination of foreign, sandy and gritty substances from the food has a salutary effect on the health of the teeth, the elimination of the fibrous part of the food and the omission of hard, bulky foods from our diets have caused complete disuse and lack of function of the masticatory apparatus. This leads to an unhygienic condition of the mouth, predisposing the teeth to caries and pyorrhea. To remedy this condition, we must eliminate the cause; and this can be accomplished only by a radical revision of the culinary art, and the manner of preparation of food.

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401 Broadway.

AN ANOMALY AND ITS TREATMENT: REPORT OF A CASE

By JULIUS CAPLAN, D.D.S., Chicago, Ill.

History.—Mr. B., aged 26, came in June 4, 1936, complaining of a constant pain of three days' duration in the left antral and left supra-orbital regions with no history of relief or exacerbation. Extraction of the upper left posterior teeth five or six years previously had been followed by apparently normal recovery. There was no history of like previous attacks. The medical history was essentially negative for any condition involving these areas.

Examination.—The pulse and temperature were normal. The patient seemed to be suffering a good deal. The left antral region showed a swelling which was soft and spongy throughout with no definite localization or fluctuation.

The teeth were missing from the upper left side posteriorly to the second bicuspid. The gums and buccal mucosa did not have the typically smooth appearance usually seen after a normal extraction. There was a band of fibrous connective tissue extending from the cheek to the region of the tuberosity. The alveolar process in this region was practically obliterated. On digital pressure, there was a thin seropurulent discharge, the source of which I was unable to locate. A roentgenogram revealed two impacted molars, the roots of the upper one extending into the antrum. The lower tooth was impacted horizontally. The upper tooth lay vertically with the crown practically centering on the lower and the roots extending into the antrum.

Treatment.—Under local anesthesia, a curved incision was made beginning just anteriorly to the tuberosity and extending forward over the crest of the ridge to the distal aspect of the first bicuspid. The mucoperiosteum was retracted upward, the crown of the lower tooth being thus exposed. As there was no movement in the tooth at this stage, it was necessary to have drills and hand chisels for further exposure. I could now see the region where the two molars were impacted. In order to determine whether there was actual fusion of the teeth, I wedged a thin-bladed elevator between them. There was movement of the lower. By putting deeper pressure on the elevator and cutting a little more of the overlaying bone, I was finally able to release the lower of the two.

The roots of this tooth curved and tapered in the same direction; which facilitated its removal. The other tooth presented a more difficult problem. It was not possible to tell from the roentgenogram the position or number of its roots. I placed an elevator between this tooth and the alveolar bone, but got no movement. I then made a cut higher on the buccal surface of the bone and again attempted movement. There being no response, I found it necessary to excise more bone, until it was finally pos-

sible to place forceps on the crown. I obtained slight movement buccolingually, but was unable to get any results from a safe amount of traction. From this, it seemed probable that there was a peculiar root configuration. I believed that sectioning the tooth at this point would aid in its delivery, but was deterred from doing this by the possibility of forcing a root into the antrum. Therefore, more extensive exposure was made to permit removal of the tooth by forceps. After the tooth was delivered,

Fig. 1.—Radiogram showing crown portion of lower of the impacted molars.

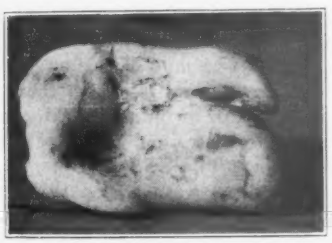

Fig. 2.—Cupping of proximal surface of impacted molar due to pressure from superimposed tooth.

there was a small discharge of pus from the antrum. The edges of the wound were curetted and some small round dark red masses which had the appearance of old coagulated blood were removed. No sections nor bacteriologic tests were made.

The wound was irrigated with physiologic solution of sodium chloride and the soft tissues placed in position. Closure was incomplete, to allow for a small wick of gauze for drainage.

Postoperative Course.—For several days there was a gradually diminishing drainage of seropurulent material. This stopped at about the end of a week. All swelling had subsided.

The patient was dismissed at that time and, Oct. 15, 1936, came in for final observation. At this time, there was no history of pain or discomfort. Examination of the wound revealed complete closure, with a slight scar, which may have remained from the original extraction.

Fig. 3.—Reconstruction of position in maxilla.

Fig. 4.—Model of operative field after lapse of four months, showing complete closure.

4802 Broadway.

DENTAL GLEANINGS FROM ARABIAN MEDICINE

By ELIAS S. KHALIFAH, D.D.S., and SAMI I. HADDAD, M.D., F.A.C.S.,
Beirut, Syria

IT is an established fact that the Arabs played an important rôle in the practice and development of dental art early in the Christian era. The Arabic manuscripts scattered all over the world testify to their ability and achievements. Although this subject has been studied and discussed by several men of note in the past, we detect certain omissions and mistranscriptions possibly due to their deriving information from translations, as the originals are not easy to get in certain parts of the world.

This prompted us to make a deep and full study of the subject. With a good knowledge of the Arabic language, and having at our disposal a good deal of material, either in manuscript or printed form, we had the advantage of obtaining information at first hand. We submit our findings, hoping to arouse more interest in this field of research and to give credit to the people to whom full acknowledgment has not been made.

Man has been through all ages a lover of beauty, and has gone as far as deifying it. The Arab's love of beauty finds expression in his literature and poetry. His sweetheart had teeth comparable only to a string of pearls.

The Arab had good teeth, and his primitive habits helped him to preserve them in excellent condition. His food was simple, consisting of dates and camel's milk. With the onset of civilization, and the varied menu introduced into his diet, he began to have trouble with his teeth; and so he went back to Nature in search of ways and means for combating this trouble. Learning that food remains must be removed from between his teeth, he started to use the toothpick; but finding that this injured his gums, he resorted to the less harmful method of cleaning his teeth with his fingers. This did not accomplish the desired effect. Again he went back to Nature for aid, and it provided him with the siwak, a piece of a root of the Arrak tree (*Salvadora persica L.*, toothbrush tree), which grows wild in certain regions of the Arabian Desert. When rubbed against the teeth, its root fibers stand out like the bristles of a modern toothbrush, which it excels in several ways. Besides cleaning the teeth and giving them a nice shiny appearance, it has a very agreeable taste, which causes an increase in flow of the saliva. Moreover, it is easy to get, and costs practically nothing.

A toothbrush is not supposed to be used more than a month or two, as longer use may have harmful results. In the case of the siwak, it is impossible to use the same bristles more than a few times, as the fibers get very soft and the slightly bitter taste is lost. All that has to be done is to cut off these bristles and use the freshly cut end, and so on until the siwak is completely used up. This was the common practice of the Arabs in the Pagan Period; i.e., the period before Islam. The Prophet Muhammad, when he instituted his Canon Law, laid down, among other things, certain rituals that every Moslem should observe before he prayed lest his

prayer be considered false. Of these rituals, ablution ranks first. This means that a Moslem has to wash his hands, mouth, face, nose, ears, neck and feet three times before every prayer. When we stop to consider that a true Moslem has to pray five times a day, we realize how important mouth cleanliness was considered by the Arabs in the Seventh Century.

Although the Prophet was an ardent believer in the use of the siwak and employed it conscientiously five times a day, he did not make its use a "fardh" (a religious duty that ought to be done), but a "sunnat" (a religious duty that is left to the discretion of the person). He is known to have said: "If I wanted to make it more difficult for my people, I would have ordered them to use the siwak with every ablution." He was contented to have

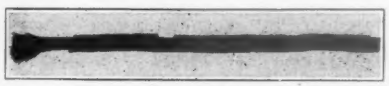

Fig. 1.—The siwak.

them clean their mouths thoroughly, using water as a mouthwash, and when the siwak was not available, they were told to use the thumb and forefinger of the right hand.

The Wahhabites of Sa'udi Arabia, are known to be strict followers of the teachings of the Prophet, and they practice dental hygiene today as their predecessors did, and every Wahhabite carries a siwak with him, even when traveling.

Inspired by the zeal and faith of the Prophet, the Arabs united and set out for a common cause, to conquer the rest of the then known world, to found a new empire and to spread a new civilization. With them went the siwak. In Abyssinia and Sudan, we find the people still using it, and no doubt their ancestors inherited it from the Arabs. In many places of the East, the siwak is still used by primitive and educated people alike.

The use of the siwak was not sufficient to combat all dental conditions, which were increasing with the advance of civilization, and the Arab, being at a loss as to what to do after Nature failed him, applied to the learned people for help. Certain recent historians have led us to believe that dental treatment in those

Fig. 2.—Facsimile of Article 14 and part of 15.

days was left to barbers and cuppers, but our studies have made us realize that, early in Arabian civilization, human teeth were treated by qualified men, and, to speak in terms applicable to those days, these men were highly qualified. Although we have no definite evidence that dentistry was considered a specialty then, we are certain that it was treated as a branch of medicine and surgery; for we

know of a number of physicians who, as early as 850 A.D., went on record as administering dental treatment. Whether they were the originators of the ideas they practised, we know for a certainty that they upheld them, commented on them and cited cases of treatment. Hence, a glimpse of the history of Arabian medicine will not be out of place in an endeavor to throw light on the dental knowledge of those times.

Early in the fifth century of the Christian era, there was founded in Gundi Shapur (Persia) a medical school, which, with the help of three other similar institutions in the East, trained men to serve their respective countries. Of the three other medical institutions, one was in Alexandria, under Greek influence, and two in Mesopotamia, under Nestorian influence. The Nestorians, who were the followers of Nestor, a Christian patriarch of Constantinople who lived during the early part of the fifth century, were noted for their culture and leadership in medicine. Because of certain religious beliefs, they were driven out of their country by Byzantine intolerance, in 428 A.D. They sought refuge in different countries of the East, some going to Egypt and others to Persia and Gundi Shapur, where they helped to develop its medical school. At about the time of the Prophet's birth, in 570 A.D., it was at its highest in development and popularity.

Medicine as a profession was very popular at that time, and, as Al Qifti[1] tells us, there was a time when there were in Bagdad alone more than 860 physicians, who, no doubt, were practising dentistry as a branch of their calling. History reveals the names of a number of families who were physicians to caliphs and other rulers for generations, and also a number of physicians who were well-known authors as well. As space and time do not allow mention of a complete list, we shall limit discussion to five of them: At-Tabari, Ar-Rozi, Al-Majousi, Ibn Sina and Abul-Qasim Az-Zahrawi, giving a summary of the work of the first

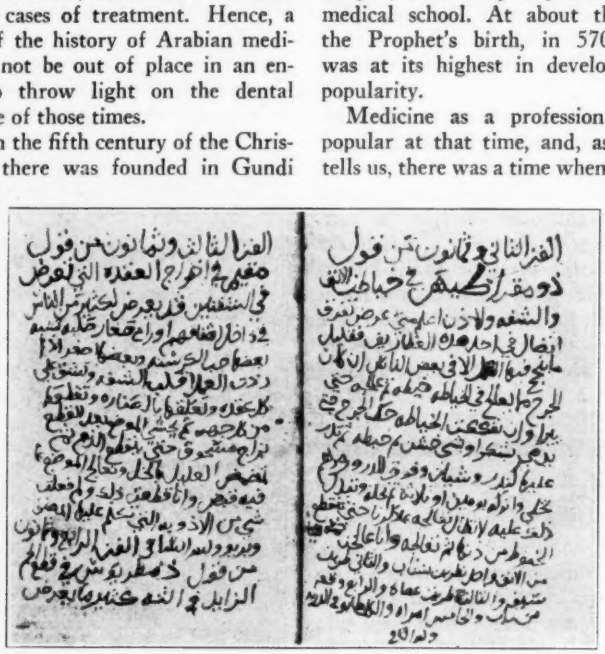

Fig. 3.—Facsimile of Articles 82 and 83 and first part of 84.

four and a detailed discussion of Abul-Qasim Az-Zahrawi and his work.

AT-TABARI

Ali ibn Rabban At-Tabari, a Persian, whose father was a physician, lived in the ninth century A.D. Ali was a Christian, but professed Islam after entering the service of the caliph. In 850 A.D., he completed his famous book on medicine entitled "Firdaus-ul-Hikmat" ("Paradise of Wisdom"), the oldest existing book on Arabian medicine.[2] At-Tabari was a great physician of his day, and the fact that he was Ar-Razi's teacher does him a great honor.

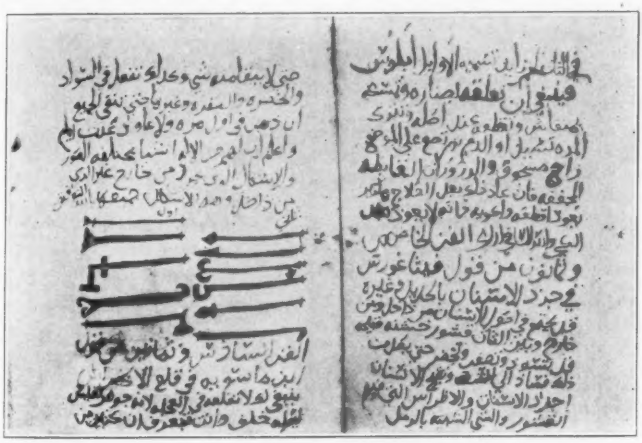

Fig. 4.—Facsimile of Articles 84 and 85 and first part of 86.

There is a good manuscript of Firdaus-ul-Hikmat in the British Museum,[3] and the book has appeared in printed form recently.[4] It contains one full chapter of five pages on the diseases of the mouth and teeth and on halitosis. Halitosis, he says, is due to fermentation from the stomach, suppuration of the gums or the presence of food débris between the teeth. The stomach, he says, should be "cleaned" if it be the cause, and gargles are prescribed. If suppuration of the gums produces it, he advises astringents and gargles. Growths in the nose are said to be sometimes the cause, in which case they should be removed. The presence of decayed teeth and tartar also causes it, and for this he advises filing away of the decayed part and cauterization of the gum. He also prescribes tooth powders for cleaning the teeth and a number of medicines to stop toothache, including boiling butter and cautery, which, he writes, should be used with care to avoid injury of the adjacent teeth and gums.

AR-RAZI

Abu Bakr Muhammad ibn Zakariyya Ar-Razi (Rhazes) was born in Persia toward the middle of the ninth century A.D. He took up music at first, then shifted to philosophy and later to medicine. He is known to the world as a great physician, the greatest of his century. He lived the greater part of his life in his country among his kinsmen, but is known to have traveled to Bagdad at the invitation of the caliph. Here, he was chosen the best of the hundred leading physi-

cians to direct the famous hospital, the site of which he chose in a very ingenious way. He instructed his men to hang pieces of meat in different parts of the city, then chose the place where the meat showed the least signs of decomposition. He was a good teacher and, we might say without hesitation, the greatest clinician that the East produced up to the Middle Ages. He is the author of 213 books, only about eight of which are extant. A complete list of his works is not possible in this short paper, but we would mention "Al-Hawi," "Al-Mansuri," a treatise on measles and smallpox, and "Al-Fakhir." The treatise on measles and smallpox is a thorough study of the subjects. Although we do not claim for him priority in describing these diseases, he was undoubtedly the first to differentiate between them as two separate and altogether different entities. The authenticity of authorship of "Al-Fakhir," while questioned by a few, we have no reason to doubt as we possess an old manuscript (Thirteenth Century), the property of one of us (S.I.H.), obtained by purchase in Persia and giving Ar-Razi as its author.

In this book, Ar-Razi has seven chapters on dentistry arranged in the following order: "The Teeth"; "Teeth on Edge"; "Decay of Teeth"; "Looseness of the Gums"; "Suppuration of the Gums"; "Pyorrhea and Bleeding Gums," and "Halitosis."

These seven chapters show a distinct improvement in subject matter and systematic work over At-Tabari's chapter. Many statements found in "Firdaus-ul-Hikmat" are repeated in "Al-Fakhir"; which shows that Ar-Razi followed the teachings of his master.

Fig. 5.—Facsimile of last part of Article 86, Article 87 and part of Article 88.

AL-MAJOUSI

Ali ibn Abbas Al-Majousi (Haly Abbas) is another physician and author of great ability. He was born in Persia and lived in the tenth century. His famous book "Kamilu-s-Sina'at" or "Al-Maliki" (The Royal) on medicine, printed in Egypt in 1877, and containing about 400,000 words, was used as a textbook,

and enjoyed a great popularity till it was replaced about a century later by Ibn Sina's Canon. In it are nine chapters on dentistry and oral surgery. (Guerini[5] mentions only one chapter.) In volume one, there is a concise chapter on the anatomy of the teeth, the description of which is very clear and systematic. It gives a clear picture of the teeth, their shape, function and the number of roots of each. He mentions that the upper third molar sometimes has four roots, but usually three, and the lower third molar three roots, but usually only two.

swelling of the gums, he advises the use of certain powders and ointments and several medicines, in addition to bloodletting and cupping.

Of halitosis, he says: "If it is due to bad teeth, clean, remove decayed part, or extract as the case may demand. If the stomach is the offender, use emetics and purgatives for its cleansing. This done, clean the teeth with powdered chalk or with siwak."

The last chapter deals with the drooling of saliva during sleep and in children.

Fig. 6.—Facsimile of last part of Article 88, Article 89 and first part of Article 90.

The remaining eight chapters are in volume two: four chapters on the tongue and its diseases, three chapters on the teeth and their diseases and one chapter on halitosis.

For the treatment of aching teeth, Al-Majousi recommends a number of medicines, and these failing, cautery, and finally extraction if the pain does not subside. For cleaning the teeth, he mentions several powders, of which pumice is an important constituent. For ulceration and

IBN SINA

Of Abu Ali Husayn ibn Abdullah ibn Sina (Avicenna) it is not an easy task to write a short biography as volumes could be written about his life, ability and achievements. Ash-Shaykh-ur-Ra'is (the chief master) and Al-Mu'allim-uth-Thani (the second teacher, Aristotle being the first), his titles, convey a better meaning than any description could give.

He was born in Persia, but, like At-Tabari, Ar-Razi and Al-Majousi, he

wrote in Arabic. At the age of 18, he was a physician of great repute; at 21, he was known to the world as an able author. Later he became known as a philosopher, poet and politician. Of the ninety-nine books that he wrote, sixteen are on medicine, the most important and famous being "Al-Qanun-fi't-Tibb" or "Canon." This, the most nearly complete book on medicine that had been written up to his time anywhere in the world, was used as a standard textbook in Europe for several centuries. It was printed in Arabic, in

Fig. 7.—Facsimile of last part of Article 90 and first part of Article 91.

Rome, in 1593, and later in India and Egypt, and contains a million words. In volume one, the one chapter on the anatomy of the teeth is written in very concise and clear form and is very similar to Al-Majousi's description. Volume two has fifty-two chapters on dental and oral subjects. The majority of these chapters are rather short, but the classification is elaborate and systematic, and undoubtedly this volume contains more material than the preceding one. The chapter topics are as follows:

Mouth and tongue:

1. Anatomy of the mouth and tongue.
2. Diseases of the tongue.
3. Loss of taste.
4. Paresis of the tongue and difficulty of articulation.
5. Paralysis of the tongue.
6. Macroglossia.
7. Tongue-tie.
8. Swellings of the tongue.
9. Defects of speech.
10. Ranula.
11. Glossitis.
12. Treatment of the fissures of the tongue.
13. Protrusion of the tongue.
14. Mouth eruptions.
15. Malignant ulcers.
16. Salivation.
17. Deodorants.
18. Hemorrhage.
19. Halitosis.
20. Mouth breathing.

The teeth:

1. General discussion.
2. Dental hygiene.

3. Exhaustive discussion of the treatment of teeth.
4. Diseases of the teeth.
5. Drugs used in the treatment of the diseases of teeth.
6. Anesthetizing drugs.
7. The loose tooth.
8. Decay of the teeth.
9. Crumbling of the teeth.
10. Discoloration of the teeth.
11. Easing the eruption of teeth.
12. Extraction of teeth.
13. Painless extraction.
14. Toothworms.
15. Causes of gnashing of teeth.
16. Elongation of teeth.
17. Teeth on edge.
18. Sensitive teeth.
19. Weakness of the teeth.

The gums and lips:

1. Diseases of the gums.
2. Bleeding gums.
3. Gum fissures.
4. Ulcers of the gums.
5. Suppuration of the gums.
6. Recession of the gums.
7. Looseness of the gums.
8. Epulis.
9. The lips and their diseases.
10. Lip fissures.
11. Swellings and ulcers of the lips.
12. Varicose lips.
13. Lip tremor.

A complete translation with commentary of these chapters will be given in a subsequent paper.

AZ-ZAHRAWI

The men that we have spoken of until now belonged to the East, but since Arab culture extended as far as Spain, we have there an outstanding representative of Arabian medicine, Abul-Qasim Khalaf ibn Abbas Az-Zahrawi (called also Albucasis, Abulcasis, Alzaravius, etc.), who was born in Spain, in the village of Az-Zahra, near Cordova.

There is a controversy about the period in which Abul-Qasim lived. It is generally believed to be the tenth century,

Fig. 8.—Facsimile of last part of Article 91 and Article 92.

A.D., but some believe that he lived at a still later date.

He studied at the famous seat of learning of Cordova, attaining the position of a classicist as a physician and surgeon, ranking with Ibn Sina and even excelling him in surgery. He served Abdur-Rahman III, caliph of Andalusia (Spain) between 912-61 A.D., during which period Arab culture was at its height, and his son Al-Hakam II in this capacity.

"At-Tasrif liman Ajiza 'an-it-Ta'lif," an encyclopedia in medicine divided into three sections, is Abul-Qasim's greatest achievement. Section I is on medicine, Section II on pharmacology and Section III on surgery. The last, shortly after its appearance, was translated into Latin, Hebrew and Catalonian and later was translated into French. It formed the basis of surgical studies in Europe for six centuries and was printed in Latin, with the Arabic text, in England in 1778.

Another striking feature of this section is the numerous illustrations, which Az-Zahrawi describes and a number of which are copied today in modern surgery.

Our study of Az-Zahrawi is based on an illustrated manuscript which we found at the National Museum of Damascus, Syria.[6] It is one of the very few manuscripts of At-Tasrif in the world. (The other manuscripts are Huntingdon 156 and Marsh 54, at the Bodleian Library, Oxford; Codex Arabicus 1980, Gotha, and Egyptian National Library, Cairo.) It begins abruptly with Article 14 and ends abruptly with Section 8 of Article 163. The transcriber's name and date of transcription are consequently missing, but the style of handwriting is Andalusian and leads us to believe that it is of an early date. Following is a literal translation of the sections dealing with dentistry:

Article Fourteen: Cautery of Aching Teeth due to Cold. If the toothache is due to cold or there is a worm in it and your medicinal treatment is unsuccessful then its cautery will be of two kinds. Either with butter or with heat. Boil the butter on the fire in an oil lamp, and take a little of it on the end of a probe around which a piece of lint has been wrapped, and apply it to the above-mentioned area repeatedly. Or, soak cotton or wool, in cold butter and apply it to the aching tooth. Heat the probe and place it on the wool until the heat reaches the bottom of the cavity.

Article Eighty-Second from the Sayings of Democritus on Suturing the Nose, Lip and Ear. Note that when a separation in these cartilages exists, success of operation is rare except in few cases. If the wound could be treated by suturing suture it then treat it till it heals up. If the sutures give way, rub the wound with sugar or something rough till it bleeds, resuture it, sprinkle on it "Kundur [powdered gum of *Chondrus crispus L.* (Irish moss)] and Shiyan [powdered gum of *Calanius draco L.* (dragon's blood)]" and over these powders apply bran ointment, and leave it two or three days. Then loosen the bandage, dress it, and keep treating it as we mentioned till the sutures break by themselves, then treat it. I treated five cases of nose injury. The first, caused by an arrow, the second by a sword, the third by a stick, the fourth due to a fall from a door-step, and fifth a woman. All were cured and God is the Healer.

Article Eighty-Three from the Sayings of Mukim on the Removal of Knot that appears on the Lips. There occurs to many people on the inside of their lips little hard swellings. Some resemble the vetch seed and some smaller. If you want to operate, evert the lip, incise over the knot, raise it with a hook and excise it all around. Pack the place after excision with powdered iron sulfate till bleeding ceases. Let the patient rinse his mouth with vinegar, and treat the place with astringents. I have operated thus but did not use any of the medicines that the author speaks of. All were cured, and God is the Healer.

Article Eighty-Four from the Sayings of Dimitrius on the Removal of the Hypertrophied Gum. It often happens that the gum hypertrophies, which the ancients call epulis. You should raise it with a hook and hold it with tweezers. Excise it at its origin and let the pus or blood flow. Apply to the place powdered iron sulfate and astringent and styptic powders. If it recurs after treatment, which often happens, excise it and cauterize it, for it does not recur after cauterization. And God is the Healer.

Article Eighty-Five from the Sayings of Pythagoras on Scaling the Teeth with Iron Instruments etc. There accumulates on the roots of teeth from inside and outside and between the gums, rough and ugly scales which may be black, yellow or green. As a result of this there is corruption of the gums and suppuration around the teeth. Scrape the teeth that have the scales or the sand-like substance until nothing remains of them. Do likewise to the black, green and yellow etc., until you have cleaned them all. If not cleaned from the first time, repeat on several days. And note that for the teeth there are different instruments of different shapes and forms for use with different teeth, those that scale from the outside differ from those that scale from the inside. Herewith are all the figures. And to God is due all success.

Article Eighty-Six from the Sayings of Ibn Masawayh on the Extraction of Teeth. You should not extract a tooth in a hurry because it is a precious organ and has no substitute. You know that many a quack who comes to extract the aching tooth finds that he has extracted the sound one. I have seen that done frequently. While extracting, loosen and extract. Loosen it, and you will extract it. Do not act like the ignorant cuppers and others. If the tooth is hollow fill it with lint or something else, and remove it without fear. Make him rinse the mouth with vinegar and salt, or with wine. If the bleeding occurs fill the socket with iron sulfate, and if you do not succeed, cauterize it. It would be better if the part of the instrument that holds the tooth is serrated like a file, as it fits better. These are the pictures of the forceps.

Article Eighty-Seven from the Sayings of Rufus on the Removal of the Roots of Teeth and the Removal of Broken Jaws. If there remains bone after extraction, you should apply on it cotton with butter for two or three days. Then introduce the tweezers and forceps that resemble the bird's beak. If it does not come out, drill around it, expose all the gum with a scalpel, and remove it with this instrument. The instruments are innumerable, but the artisan who is skilful and experienced in his profession, can do things that the ancients did not know, and his mind will point out to him many a thing. And those (are the instruments).

Article Eighty-Eight from the Sayings of Basha on Sawing off of Teeth that are Growing over others. The teeth that erupt in an unnatural path are ugly in appearance especially if it happens to women or to a mate. If it erupts out of place, extract it with any instrument you have, or saw it off, or file it. If it is adjoining another, cut it with this instrument, which is a fine saw. And your cutting of it should be in several days lest you loosen other teeth, but if it is very firm, file it with a surgical file, and this is its picture. Its blade should be part of it (blade and handle all one piece) and very finely serrated like a needle file. File little by little during several days with care lest you loosen others. If a molar or incisor breaks, file the edge that remains, so it does not hurt the tongue. And God is the Healer.

Article Eighty-Nine from the Sayings of Hebron on Wiring the Teeth with Silver and Gold Wires. If there happens to any one a blow, a trauma or a fall, take silver or gold wire, preferably gold, and wind it several times around the two healthy teeth including the loose one between them in a strong and accurate manner. This is called wiring. Tighten it gently and carefully. Cut what remains from the wire and hide both ends lest they hurt the tongue. Galen made a tooth of oxbone and wired it between the sound teeth with a gold wire, and it did not hurt while eating. Wire as has been mentioned. The silver wire is not

good, gold is better to work with. And God is the Healer.

Article Ninety from the Sayings of At-Tamimi on Cutting the Frenum under the Tongue which Interferes with Speech (Tongue-tie). This frenum under the tongue might be present at the time the person is born from his mother's womb, normal or abnormal, and might be accidental from a healed wound. To operate is to open the patient's mouth while his head is in your lap, raise the tongue, and cut that frenum crosswise until the tongue is freed from its tie. But if there be a scar due to a healed wound, put a hook in it, and cut crosswise until the frenum is seen and the scar is loosened. Beware not to make the wound deep in the flesh lest you cut the artery and cause bleeding. Rinse the mouth with rose water and vinegar or with cold water. Then put under the tongue a linen plug which the patient holds all night lest the wound re-unites. And if there is bleeding, apply to the place powdered iron sulfate. If the blood gets the best of you, cauterize with a lentil-shaped cautery, then treat with the different medicines until it heals. And God is the Healer. This is the description of the lentil-shaped cautery.

Article Ninety-One from the Sayings of Al-Mas'oudi on the Removal of the Frog under the Tongue (Ranula). There occurs swelling like the little frog preventing the tongue from its normal function, and may enlarge till it fills the mouth. To operate is to open the patient's mouth in any way, in the sun if you wish, and see the swelling. If you see it dark in color, black and hard, and not sensitive to the patient, do not touch it for it is a cancerous swelling. But if it is whitish and contains fluid, put a hook in it and incise with a fine scalpel from all sides. If the blood gets the best of you while doing your work put powdered iron sulfate till the bleeding stops. Then go back to your work till you remove it completely. The patient rinses with vinegar and salt. Treat it with the different medications till it heals. This is the picture of the hook. And God is the Healer.

Abul-Qasim Khalaf ibn Abbas Az-Zahrawi was an honest man like the rest of his colleagues. Footnotes were unknown in those days, but he always stated his bibliography at the beginning of every paragraph as this manuscript shows, and gave credit to those who deserved it. For this honesty and faithfulness, he and his colleagues were called "compilers" by certain authors.

The Western writers who translated the Arabic books into Latin during the Dark Ages of Europe rarely gave their sources of information, but adopted these translations. Constantine the African is one of that class and Guy de Chauliac, who lived in the fourteenth century, is another. A dental historian,[7] after describing the ability and great works of Guy de Chauliac, and giving him the title "The greatest surgeon of the Middle Ages," goes on to say:

> Worthy of being recorded are the names which Guy gives to the different kinds of teeth. After having said that these latter are generally thirty-two, but sometimes only twenty-eight, he adds that the sixteen teeth of each jaw are divided into: deux duales, deux quadruples, deux canines, huiet maschelieres et deux caisseaux.

Four centuries before Guy de Chauliac, Ali Abbas Al-Majousi[8] and Ibn Sina[9] used these names. Guy translated them literally, word for word, and published them as his own. It seems that Guy and his class were not called compilers!

Az-Zahrawi was a scientific man. His Article 86, on the extraction of teeth, shows it. Yet he is called "timid"[10] because he did not extract in a hurry. Was he timid? Is it reasonable to surmise that a great surgeon is afraid of an extraction? The barbers and quacks extract in a hurry, and get something else along with the tooth. Who, knowing the anatomy of the jaws and teeth, would extract a tooth in a hurry without loosening it

first? Science is one thing and quackery another. Az-Zahrawi spoke overwhelmingly against quackery because his methods were scientific.

SUMMARY

Early in the Pagan Period, the Arabs knew and practiced dental hygiene. Their literature and religious teachings show it.

The siwak, "Nature's toothbrush," was used by the Arabs long before the rest of the world knew anything about toothbrushes and dental health.

Dentistry was a branch of medicine in the Arab culture, and is discussed in their books.

The Arabs contributed original ideas on dentistry and were not mere compilers. They were not timid, but scientific.

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ALLOY *pH*

By ORMAN WHITMAN, D.D.S., Calgary, Canada

AMALGAM, with all its faults, remains the most widely used filling material. Because the problem of the perfect amalgam filling has been complicated by many variables, it is difficult to establish a technic that will give constant results.

These are: (1) the variable of the alloy composition; (2) the method of preparing the alloy from its various components; (3) the method of amalgamating (the dentist's), and (4) the method of insertion (the dentist's).

The first problem is gradually being clarified under the direction of the Bureau of Standards and Associates. The second problem was dealt with in the article "Sintered Alloy." The fourth has been fairly well settled under the direction of more able men than I. The third, that is, the manner of manipulation, will be discussed briefly.

Several years ago, I was struck with the wide variation in appearance of amalgam fillings in the same mouth, the work having been done by one man at different periods, apparently with the same alloy.

Correspondence with manufacturers offered no solution. One reason suggested by a manufacturer was that perhaps the dentist varied in health and vigor at the different sittings. This explanation was at first discarded. Later, I began to think that the statement might be a partial truth, but in a very different way from that suggested.

The common method of manipulating the amalgam is to triturate it in the mortar until shiny and then remove to the hand and complete the amalgamation. If the dentist is feeling low and the weather is hot, there will be in the hand, in addition to the alloy and mercury, perspira-

tion with an acid reaction, which will partially remove the oxides from the alloy, and cause it to form a better union with the mercury. In other words, the older men knew that they obtained better amalgamation in the hand, but the reason that they had better results was in the acid reaction of the perspiration; and the more they perspired, the better the fillings were.

To get results more nearly constant, we must create an artificial perspiration or acid p_H in which to work.

Taking the common acids, we find that nitric acid forms with tin metastannic acid, which is insoluble. Silver forms with hydrochloric acid insoluble silver chloride. Hence, these two would not do. Sulfuric acid would seem to form soluble salts with all the components of the alloy, namely, silver, copper, zinc and tin.

May I suggest the following technic?

Triturate the alloy and mercury in the mortar until shiny. Remove to a clean dry hand and add 2 or 3 drops of from 0.25 to 0.50 per cent sulfuric acid. We are barely able to taste the acidity. Complete the trituration. Wash while working under water (not saliva).

Amalgamation will be found to take place more quickly and uniformly. The mix will be more fluid. It is easier to expel the excess mercury. We can expel more mercury and hence decrease that bugbear of amalgam fillings, coefficient of expansion. The filling will be from 10 to 20 per cent stronger than amalgam triturated at p_H 7, this factor depending on the amount of oxide present in the original alloy.

The material will be found to set more quickly. If not carefully washed, the filling is more irritating in the mouth. Time, the use of cement and phenol seem to eliminate this difficulty. When the filling is subsequently polished, it will retain that polish.

It is interesting to note that, a year later, I find the following by Raymond R. Rodgers, of Columbia University, writing in *Industrial Engineering and Chemistry* under the title "Cladding of Ferrous Products (Namely Stainless Steel)." "As far as the author is aware, no attention has been paid to the film of nonmetallic material . . . probably oxide . . . which forms rapidly on the surfaces of these materials under ordinary atmospheric conditions. This film is so thin that the metal covered by it *may appear bright to the eye* and entirely free from non-metallic material."

Mr. Rodgers was able to demonstrate the presence of the above-mentioned film. It is not at all difficult to demonstrate an oxide film on all dental alloy. It is even found on gold foil.

The failure of the mechanical mixer carefully used is not due to heat, but to the presence of the oxides which it collects and mixes with the amalgam. I see no objections to a nonoxidizing mechanical mixer with controlled p_H. For the same reason, pluggers should be nonoxidizing or nearly so.

There does not seem to be any time but at the mixing that amalgam p_H can be governed.

In the hope of securing the same effect with less irritation, other acids were investigated. It was early realized that the p_H would have to be changed regardless of the strength of the acid and that the same result could be arrived at by reducing the strength of the stronger acids.

It is not to be understood that this is the answer to the amalgam problem. It is merely hoped that we may be able to improve and standardize amalgam fillings by a constant manipulation p_H.

224 Seventh Avenue, West.

FURTHER OBSERVATIONS ON MEDIAN ANTERIOR MAXILLARY CYSTS*

By EDWARD C. STAFNE, D.D.S., and LOUIE T. AUSTIN, D.D.S., Rochester, Minn.

IN a previous study[1] of what Meyer has termed "median anterior maxillary cysts," three of these lesions were selected to illustrate the three types of epithelial lining. The roentgenograms of several cysts were shown. The cysts were of the size most commonly seen, and the statement was made that few cysts were encountered that were larger than those illustrated. It was suggested that these cysts do not tend to grow beyond certain limits because drainage of the contents to the surface may take place. Drainage may be constant or intermittent, and may be so scant that it cannot be detected grossly. It probably is readily established because the bony cavity that the cyst occupies is not closed, but communicates directly with the oral and nasal cavities. It is not difficult to conceive that, in some instances, the avenues of drainage may be completely closed, and the pressure from within the cyst may not be relieved; and, as a result, the cyst may continue to grow. It is not certain that this explanation for continued growth is correct; nevertheless, there is reason to believe that a few median anterior maxillary cysts continue to grow and become very large.

Median anterior maxillary cysts that have reached several centimeters in diameter, but which are still fairly well confined to the median line, offer little difficulty in diagnosis. One that was rather large and yet had not involved any of the permanent teeth is shown in Figure 1, *a*.

*From the Section on Dental Surgery, The Mayo Clinic.

REPORT OF CASES

CASE 1.—A man, aged 38, came to the clinic Sept. 28, 1935, complaining chiefly of a dermatitis, but also of swelling and pain directly posterior to the upper anterior teeth, from which there had been drainage on several occasions. Oral examination revealed profuse drainage of pus. The roentgenogram revealed the cyst shown in Figure 1, *a*, and a diagnosis of infected median anterior maxillary cyst was made. As it was thought advisable to postpone operation until the acute infection had subsided, the cyst was not removed until October 10. The surgical approach for the removal of these cysts is, of course, from the surface of the palate, as this gives access to the cyst, and there is little danger of injuring the permanent teeth. At operation, it was found that the infection had produced extensive destruction of the soft tissue on the surface of the palate. It was difficult to retract the tissue, and when it was retracted, the portion of the palatal bone overlying the cyst was found to have been destroyed and a large portion of the cyst was exposed. An attempt was made to remove the cyst intact, but it also had undergone such destruction by the infection that this was impossible. It was almost completely destroyed while being removed; which was discouraging, as evidence of what was probably an accessory cyst had been noted in the roentgenogram (Fig. 1, area designated by arrows), and satisfactory microscopic sections probably would have demonstrated the presence of such a cyst. A good view of the bony cavity did show a definite concavity, almost 1 cm. deep, and situated to the left of the main cavity. There was no doubt that the concavity was in direct communication with the main cavity. The occurrence of small

cysts in the walls of median anterior maxillary cysts is characteristic, and the radiolucence in the lateral aspect of the image of the main cyst may be roentgenographic evidence of the budding of such a daughter cyst. If it is, the clinical picture is of unusual interest and extremely rare.

Microscopic examination of some of the fragments of tissue removed revealed that the lesion was a cyst lined with squamous epithelium. Because of the extensive inflammation and destruction of palatal tissue, the wound healed very slowly.

A cyst which is slightly larger than that found in the previous case, but which had become sufficiently large to involve at least two of the permanent teeth is shown in Figure 1, *b*. This cyst was still small enough to warrant a definite roentgenographic diagnosis of median anterior maxillary cyst, although involvement of the permanent teeth confused the picture.

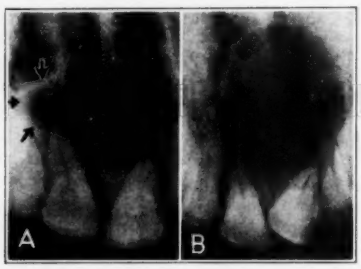

Fig. 1.—*a* (Case 1), accessory cyst (indicated by arrows) on left border of main cyst; *b* (Case 2), cyst.

Case 2.—A man, aged 55, who came to the Section on Dental Surgery, Aug. 26, 1935, had been experiencing a sensation of numbness in the region of the upper anterior teeth, and had noted a swelling on the labial surface of the alveolar process above the incisor teeth for about one year. There also was a swelling on the surface of the palate. No drainage from the cyst could be demonstrated and there was no evidence of previous drainage. The upper central incisors did not respond to tests for vitality. When the cyst, which was lined with epithelium, was removed, it was found that the bone surrounding the apices of the roots of the central incisors had been destroyed, and one side of the root of the right lateral incisor was exposed. There was a perforation on the labial surface of the alveolar process, and also on the bony floor of the nose. The palatal surface of the alveolar process had undergone more extensive destruction. A line representing the original position of the anterior palatine canal would have passed through the center of the cyst, which no doubt had its origin in the canal.

Fig. 2 (Case 3).—Bite roentgenogram showing cyst of maxilla.

When cysts become so extensive that they encroach on and involve many of the permanent teeth, it is often difficult and sometimes impossible to establish their origin. The anterior palatine canal has been overlooked as a possible source, and it is probable that some of the large cysts of the maxilla are median anterior maxillary cysts, one of which is illustrated in Figures 2 and 3.

Case 3.—A man, aged 34, first came to the clinic Oct. 25, 1918. At that time, he had a lymphangioma removed from the

tongue. He returned, Aug. 30, 1934, for a general physical examination and surgical treatment for a pilonidal cyst. He was referred for a dental examination incidental to the general physical examination. Dental roentgenograms revealed a cyst of the maxilla extending from the first molar region on one side across the midline and up to the first molar region on the opposite side. It had replaced much of the bone around the roots of teeth that were within its range and had extended well into the interdental septums. In view of its large size, one would expect to find a marked enlargement over the external surface of the maxilla, but there was little evidence of its presence, except in the roentgenograms. There were no fillings nor caries in the teeth approximating the cyst. No pain had been experienced relative to these teeth, and there was no history to suggest that the pulps in any of them had been or were infected. When the lesion was removed, Sept. 14, 1934, it was found to be a large single epithelium-lined cyst which was continuous over the midline.

In a consideration of the etiology of this cyst, the possibility that it was of dental origin must be reckoned with. The first thing that comes to mind is a dental root cyst which may have developed from the roots of one or more of the permanent teeth. The development of such a cyst is invariably preceded by the death of the pulp of the teeth. It is, of course, also possible that the cyst could have had its origin from one or both of the missing bicuspid teeth; but if it had developed from only one of these teeth, it probably would have been confined to the one side. If both of the missing bicuspid teeth had produced cysts, involvement of both maxillae could be accounted for, but these cysts would remain as two separate lesions, while the one in question, even though very large, was a single cyst. This

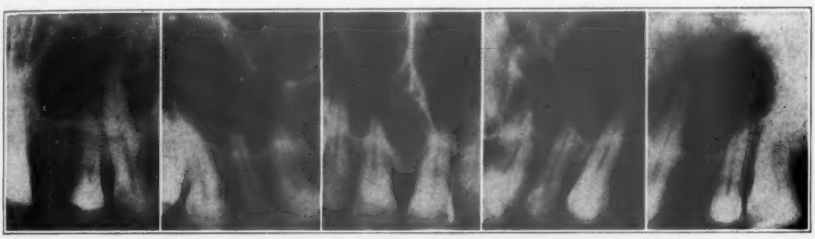

Fig. 3 (Case 3).—Regular dental roentgenograms showing cyst.

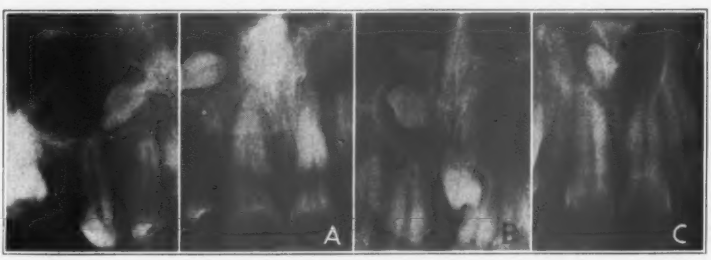

Fig. 4.—*a*, dentigerous cyst associated with a left supernumerary central incisor; *b*, development of dentigerous cyst on left supernumerary incisor and incipient cyst in anterior palatine canal; (Case 4) *c*, median anterior maxillary cyst and supernumerary central incisor.

would also hold true if epithelial islands from the dental lamina or those associated with retained roots of deciduous teeth were considered as a possible source. That it was not a dentigerous cyst is certain, for there had not been nor were there any unerupted teeth. If the cyst had been lined with ciliated columnar epithelium, it might have been a paranasal sinus, although some median anterior maxillary cysts are also lined with this type of epithelium. This cyst was lined with squamous epithelium; which, when one is prone to make a diagnosis of dentigerous cyst.

In a previous article by one of us,[2] attention was called to the fact that dentigerous cysts are frequently associated with mesiodens, this conclusion being based on ten instances in which there were mesiodens and also cysts in the anterior part of the maxilla. The possibility that the supernumerary teeth were not the source of all of these cysts was not then considered; but, in the light of present-day knowledge of cysts of the an-

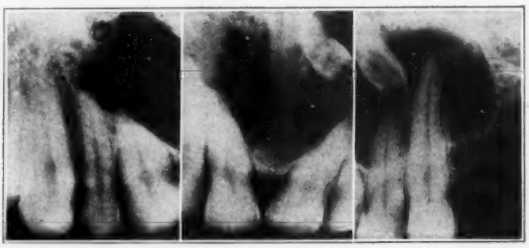

Fig. 5.—Median anterior maxillary cyst and supernumerary right central incisor.

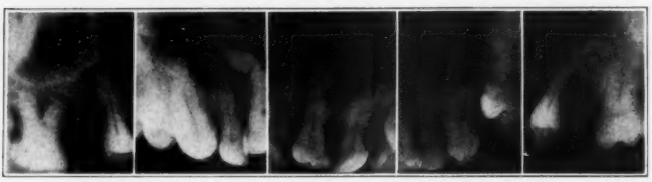

Fig. 6.—Large cyst which could be dentigerous, but which probably is a median anterior maxillary cyst.

together with the fact that the occurrence of cysts in the anterior palatine canal is common, suggests that we were dealing with a large median anterior maxillary cyst.

A diagnosis of median anterior maxillary cyst is sometimes made difficult by the presence of unerupted supernumerary central incisors (mesiodens), especially when they are superimposed on the image of the cyst in the roentgenogram, or have actually become included in the cyst; terior maxillary region, one would be obliged to reconsider the diagnosis of dentigerous cyst in several of these cases. A review of the ten cysts referred to and others observed since that time affords evidence that some of them were median anterior maxillary cysts.

There is, of course, no doubt that dentigerous cysts develop from mesiodens, for several such cysts have been seen in their incipient stage, or when sufficiently small to demonstrate a definite continuity

with the crowns of the teeth from which they developed. A cyst observed recently and which had developed from the enamel organ of an upper left supernumerary central incisor is shown in Figure 4, *a*. The cyst which extends distally is situated at some distance from the median line. There is no evidence of any enlargement of the anterior palatine canal.

That dentigerous and median anterior maxillary cysts may develop independently of each other in the same person is also possible. It is only when both cysts are still relatively small that this can be definitely demonstrated roentgenographically. The roentgenogram shown in Figure 4, *b* suggests such a condition. A definite dentigerous cyst has developed from the inverted upper left supernumerary central incisors, and the spherical-shaped area of radiolucence seen between the two supernumerary teeth is evidence of a small cyst in the anterior palatine canal. It is possible that the two cysts may continue to grow extensively, become superimposed one on the other and appear roentgenographically as one large cyst. It would then be impossible to see that the cysts had originated from two sources.

In Figure 4, *c* is shown a cyst the roentgenographic appearance of which would alone warrant a rather definite diagnosis of median anterior maxillary cyst. It is of a size not uncommonly encountered and has been erroneously referred to in many textbooks as a large anterior palatine fossa. There is also a supernumerary tooth present, and it is this fact that prompts a report of the following case.

Case 4.—A man, aged 48, came to the clinic, Dec. 5, 1935, because of a urethral stricture. A dental examination was included, and the dental roentgenogram revealed a median anterior maxillary cyst and a supernumerary central incisor (Fig. 4, *c*). The patient was not aware of any drainage from the cyst, but a little drainage could be demonstrated at a point near the anterior palatine papilla when pressure was brought to bear on the palate. There was a slight swelling on the surface of the palate, but none on the labial surface of the alveolar process. The incisor teeth were free from caries and of normal color, and responded normally to tests for vitality. In view of the drainage, removal of the cyst was advised. The almost negligible danger of injuring the incisor teeth and the ease with which a cyst of this size can be removed, if the proper surgical technic is followed, were also considered in making this decision. The cyst was removed Dec. 10, 1935. The soft palatal tissue was retracted posteriorly to a point beyond the opening into the anterior palatine canal. The tissue that was retracted was carefully dissected away from the contents of the canal, which were firmly attached to the palatal tissue. The opening into the anterior palatine canal had to be enlarged very little to allow enucleation of the cyst. The walls of the round bony cavity that the cyst had occupied were smooth, and there was no communication with the incisor teeth. The supernumerary tooth that had been noted in the roentgenogram could be distinctly felt within the cyst which was removed, but no part of it could be seen on the surface, although the apex of the root was very near the periphery. A postoperative roentgenogram of the entire specimen would have been of interest, but this did not occur to us until after microscopic sections had been made. The microscopic examination revealed a cyst lined with squamous epithelium, and a small conical tooth in the wall of the cyst.

The diagnosis of median anterior maxillary cyst was verified at operation, when it was definitely demonstrated that it occupied a cavity which was merely an enlargement of the anterior palatine canal, and which had been produced by the cyst. The situation of the cyst and the surgical technic for its removal were the same as in several cases in which median anterior maxillary cysts were removed previously.

The microscopic examination revealed the presence of nasopalatine vessels, nerves and mucous glands in the walls of the cyst; a finding which has been described in previous microscopic studies of median anterior maxillary cysts.

COMMENT

A diagnosis of median anterior maxillary cyst having been established, it is interesting to try to account for the presence of the supernumerary tooth within the cyst. It is almost certain that it did not originate or develop within the anterior palatine canal, a situation which is between but not within either maxilla, although it is possible that it could erupt into the anterior palatine canal. The most plausible explanation is that a cyst which had origin in the anterior palatine canal continued to grow and envelop the small tooth that was situated near the canal.

In Figure 5 is shown what formerly would have been considered a dentigerous cyst associated with the supernumerary tooth seen on the right of the median line; but, in this case, it also is possible that it is a median anterior maxillary cyst which encroached on the tooth. The marked separation of the roots of the central incisors suggests that pressure from the cyst was first exerted at that point as it grew and extended laterally to both sides. Any separation of the permanent teeth caused by a cyst which had its origin from the supernumerary tooth would be likely to take place between the right central and lateral incisors or between the right lateral incisor and cuspid. It is also very doubtful that such a cyst would have extended across the median line and so far to the left. On the contrary, it probably would have been confined to the right maxilla.

The roentgenographic appearance of the cyst shown in Figure 6 is very similar to that shown in Figure 3. There is an unerupted supernumerary tooth near the apex of the left central incisor; which introduces another etiologic factor and the possibility that this cyst is dentigerous. There was no evidence that it was a dental root cyst, for the teeth in the region of the cyst were free from caries, and all of the teeth were present with the exception of the upper right first bicuspid. The root of this tooth was still present at a point near the crest of the alveolar ridge, but it was separated from and not involved by the cyst.

Several years ago, one would probably have said with considerable assurance that this was a dentigerous cyst which had its origin from the supernumerary tooth, but such a diagnosis would undoubtedly be questioned now that more is known of median anterior maxillary cysts, and particularly since Meyer[8] has called attention to the frequency of their occurrence. It is not difficult to conceive that this cyst had its origin in the anterior palatine canal, for it extended into both maxillae, and one would probably be justified in favoring a diagnosis of median anterior maxillary cyst.

SUMMARY

While small median anterior maxillary cysts should present no difficulty in diagnosis, those of extensive size do; for when they have encroached on the roots of the teeth, it may be impossible to distinguish them from dental root cysts. Median anterior maxillary cysts do occasionally attain considerable size, and probably some of the large cysts of the maxilla whose etiology is obscure should be thus classified. There is no doubt that dentigerous cysts develop in association with supernumerary central incisors (mesiodens). The presence of a supernumerary tooth and a large cyst in the anterior part of the maxilla is not conclusive proof that the cyst is dentigerous. In some instances, median anterior maxillary cysts continue to grow, and en-

croach on or envelop unerupted supernumerary teeth, the presence of which are merely coincidental.

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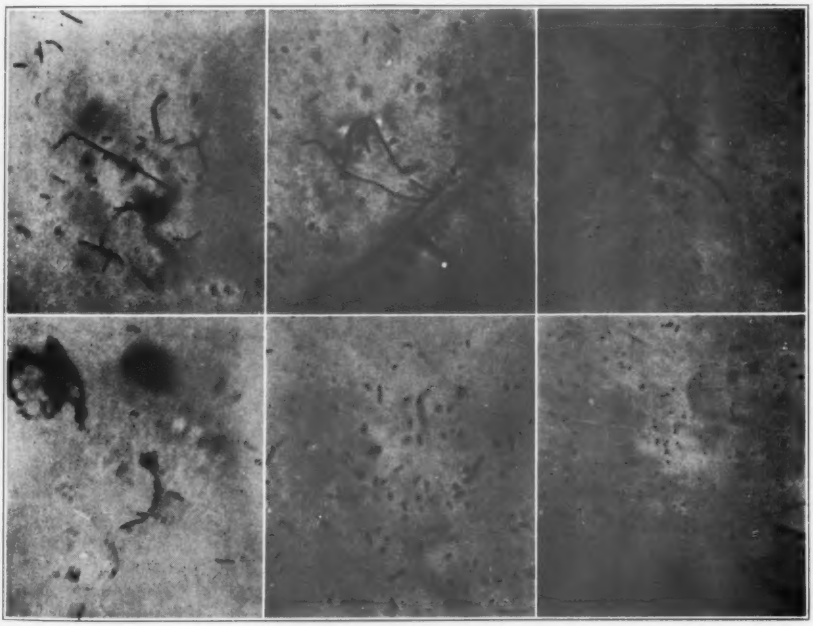
ORAL FLORA

By P. H. BELDING, D.D.S., and L. J. BELDING, M.D., Waucoma, Iowa

THE accompanying photomicrographs are submitted in the hope that they will save much time and speculation for those who are endeavoring to grow the oral cavity and grown aerobically. It is extremely pleomorphic and illustrates that many of the coccidoid forms found in the oral cavity may be transitional



Appearance of culture from age of 24 hours (above, left) to age of 10 days (below, right).

the members of the oral flora in pure culture. The organism was isolated from forms in the life cycle of pleomorphic organisms.

IMPACTED UPPER THIRD MOLAR INVOLVING THE ANTRUM AND COMPLICATED BY SYPHILIS: REPORT OF A CASE

By HARRY L. BISNOFF, D.D.S., Jamaica, N. Y.

History.—L. B., aged 21, a colored house servant, was referred by her dentist whom she had consulted four weeks before because of pain and swelling of the right side of the face involving the upper molar area. For a few days, palliative treatment was attempted, when, the pain and swelling persisting, the area was incised intra-orally over the second molar at the muccobuccal fold. There was a discharge of suppurative material and, after a few days, the drain was left out. The

Fig. 1.—Impacted third molar lying above apices of first and second molars.

pain and swelling subsided. About two weeks later, slight discomfort again became evident, but without swelling. The systemic history was negative, except for a slight rash on the hands, which, the patient stated, a physician had treated as due to the dye in her clothes, the physician's report being that the rash had no bearing on the oral condition and should be treated independently.

Examination.—Jan. 2, 1936, when the patient was referred to me, a small intra-oral roentgen-ray film revealed a horizontally impacted upper right third molar lying over the apical region of the first and second molars. (Fig. 1.) Directly distad from the second molar where the incision was previously made, there was a small opening the size of a pea. Distention of the

Fig. 2.—Lateral view, showing probe in antrum, inserted through sinus tract at buccal fold.

tissues and careful probing gave evidence of a sinus tract, from which came a foul odor. There was no inflammation evident and the oral tissues otherwise looked normal.

Treatment and Diagnosis.—Through

the existing opening, the area was irrigated with physiologic solution of sodium chloride. This yielded a profuse return of foul smelling débris.

and 3 show the probe in the antrum, which was extensively involved. Figure 4 is an anteroposterior view of the right antrum and the impacted molar invading it. A few

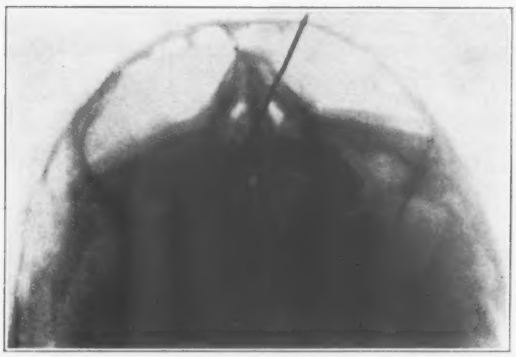


Fig. 3.—Head plate, in occlusal view, showing probe in antrum.

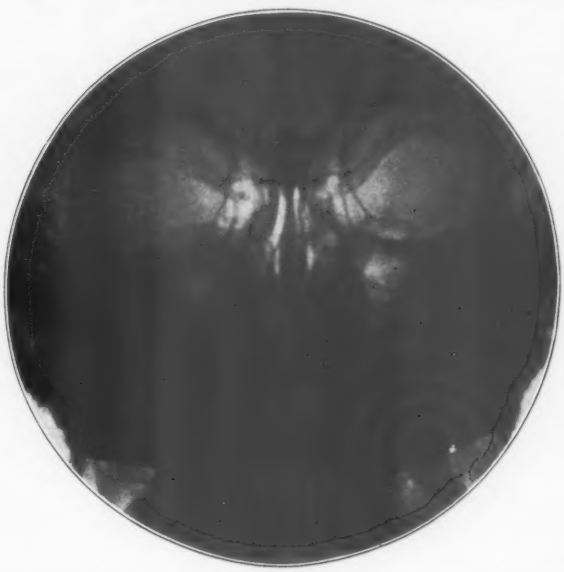


Fig. 4.—Anteroposterior view, showing the impacted molar invading the right antrum.

A probe was inserted and met no resistance. Larger roentgen-ray plates were taken with the probe in place. Figures 2

days' irrigation with physiologic solution of sodium chloride eliminated the foul odor and the return of débris ceased. Impacted

molar, with involvement of the antrum, i.e., distention and necrosis of the antral wall, was diagnosed; the impacted tooth apparently occupying a buccopalatal position.

Operation.—January 6, a mucoperiosteal flap extending from the bicuspid region was laid back, the area beyond the second molar thus lying revealed. Extensive destruction of the osseous structure forming the antral wall was evident, some peripheral bone being thin and necrotic. Through this opening, the entire antrum was thoroughly irrigated to clean out a large amount of foul débris. Except for the already protruding and diseased bone, it was unnecessary to cut out any bone to remove the impacted tooth, which was reached through the antrum. After elimination of the diseased tissue and involved membrane, the wound was closed and a drain inserted through the lower margin of the wound. Postoperatively, physiologic solution of sodium chloride irrigations returned clear and the rhinologist thought a nasal opening would not be necessary.

Complications.—The rash that was first evident on the hands was now also on face, neck and arms. While the incision made in operating January 6 healed nicely, the point of original incision made prior to the time the patient was referred persisted and grew larger. The physician reported that the rash was due to a dye or an allergic reaction and that the patient was being treated for it. Despite the fact that, in a few days, the rash gave evidence of clearing up, a Wassermann test was suggested. The suggestion was not acted on.

I then decided, Feb. 8, 1936, to make a plastic repair, in an attempt to close the opening. The patient was feeling well and suffering no discomfort. For a few days, this plastic area healed nicely, then started to slough. On consultation, the rhinologist advised cauterization of the epithelized periphery of the opening, to induce granulation and to defer nasal irrigation of the antrum. This attempt did not prove sufficiently successful and, on my insistence, a Wassermann test was made. The reaction was four plus. Subsequent Wassermann tests yielded the same result. Immediately, antisyphilitic treatment was instituted, and the opening became progressively smaller.

Subsequent irrigation yielded no pus. The rash was fading out and the physician still contended it was incidental to the syphilitic infection.

For a few weeks, a general improvement of the oral condition continued. When the patient was last seen, in June, there was a slight swelling of the mucosa toward the anterior teeth. As the physician thinks it may be due to the skin condition, my insistence that a rhinologist be again consulted has been disregarded. Since then, I have not seen the patient.

This report is rendered to emphasize:

1. The advisability of cooperation between physicians and dentists especially in cases apparently involving the systemic condition.

2. The possible factor of syphilis (as well as metabolic disease) in wounds that do not heal.

3. The need for cooperation between rhinologist and oral surgeon in cases involving the antrum.

4. The danger of exposure of the dentist who operates in such a case without knowledge of the blood picture.

THE JOURNAL *of the* AMERICAN DENTAL ASSOCIATION *and* THE DENTAL COSMOS*

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Editorial Department

THE IDEAL DENTIST

NOW that the time of year is at hand when the product of the dental schools is being evaluated in terms of examinations, and when the decision must be made by our teachers and members of state boards as to who in the student body shall be adjudged qualified to assume the obligation of professional status, it would seem appropriate to consider somewhat carefully the qualifications of the ideal dentist.

Not that every graduate need be expected to achieve the ideal in practice—that would be a consummation too utopian to contemplate—but that a consideration of what may be adjudged the ideal might at least stimulate the ambitious neophyte to strive for the best there is in him, to the end that he shall gain a more exalted conception of what dentistry at its best represents.

An ideal dentist should be a man endowed with unusual ability along various lines. He should have the instincts of the scientist with the manual dexterity of the artisan. But superlative ability in either one of these attributes will not of itself suffice. A man may have the mentality of a scientist and be endowed with the fervor of research. He may desire with all of his soul to seek out the hidden mysteries of his calling; he may delve deep in chemistry and bacteriology and anatomy; he may make himself familiar with the physical properties of all the materials used in the dental profession, and have an intelligent conception of when and where they shall be employed; he may stand out as a man of unusual learning in the science and art of his calling and command the admiration of his fellows on the platform or in the laboratory; but unless he has the thing called manipulative ability, his attempts at achievement fall lamentably short. As was said of a certain student on one occasion, "The boy has a well-informed mind and the most ignorant fingers." And there is little that is more pathetic than this, unless it is the student who has neither the brain nor the hand.

We are not raising the question at this time as to how many or how few there are of this latter type in our profession. Manifestly there are altogether too many for the welfare of the profession and the people. But even with a combination of mental acumen and manual dexterity, there is something more needed in the category of the ideal dentist.

The ideal dentist should be endowed with the attributes of the sympathetic physician and surgeon. His heart should go out in solicitous concern for the ills of his fellowman. It should be a part of his very nature to extend a helping hand in case of pain or discomfort of any kind, and with gentle mien to quiet the aching nerves of human kind. The ideal dentist must never be indifferent to the sufferings of those committed to his care. And in all of this there should never be the dominant incentive of material gain. Professional and scientific achievement is something apart from economic sagacity, though there should be nothing to prevent the attainment of both.

The ideal dentist should have the instincts of the artist and be able to imitate Nature in her varied moods of color and of form.

A dentist who is lacking in artistic sense is handicapped in one of the essentials of successful practice.

Without specific reference to the matter, it is taken for granted that the dentist should be clean physically, mentally and morally.

But there still remains one thing more. A dentist may be a scientific research worker, a skilled mechanic; he may be endowed with the attributes of the physician; he may be an artist, and yet fall short of what an ideal dentist should be. With all of these essentials, he may still fail to measure up to the ideal when it comes to the sum total of what the practice of dentistry demands. The outstanding requisite has yet to be mentioned.

The one thing needful in the life of every dentist is that in daily practice there shall be embodied the principles of ethical and cultured conduct. Without the application of ethics, all of the other attributes go for little or nothing. The essentials of life, professional or otherwise, are indissolubly linked with equity and justice among men; and in estimating the qualities of the ideal dentist, this is the foundation rock on which all of the other qualities must be built.

To sum up: The ideal dentist must be keen of mind, expert in execution, kind and sympathetic in temperament, artistic and discriminating in taste, solicitous for the welfare of others, above reproach in every relation of life and adamant in the principles of equity and justice among men. These are the fundamentals. The detailed niceties of human conduct will be added day by day as professional experience matures.

WHY ORGANIZED DENTISTRY?

IN the light of our present-day supposedly highly developed sense of appreciation of the desirability of coordinated effort, the question in the title above would appear to be untimely. The question, however, is frequently heard in dental circles and not infrequently asked in all seriousness. Accepting the query from the serious vein, we shall attempt to indicate a few of the numerous reasons, as well as some of the imperative needs, for organized dentistry.

Authors
June-1937

At a time when the whole world seems to be in a state of political and social upheaval, it must be apparent to all that every effort must be made to preserve the integrity of the profession if we are to survive the changes in political and social life which seem to be imminent as the result of the newer concept of the governmental obligation to society.

Changes in our professional and social status are evident, and it is also evident that, during this evolutional period, it will be necessary for dentistry to maintain a solid front in order that we may uphold and pursue our ideals and ambitions in the direction in which the face of dentistry has been set for the past two decades. Indeed, the very character of the practice of dentistry may undergo radical change if we are not alive to the exigencies of the situation and present an organized determination to control the character of dental practice of the future.

The political trend of the day is plainly toward social security, and it is quite evident that the health professions will be called upon to provide a health service that will adequately care for the needs of all classes, and largely under the direction and sponsorship of the Government. While the physical equipment for such a stupendous undertaking, so far as the medical profession is concerned, appears to be ample, in dentistry that phase of the problem is a more serious one, and one that will require much serious thought for solution. The physical equipment of dentistry at the present moment is judged to be sufficient only to take care of the needs of the children of the country, and that only because of the possibility of the application of the principles of prevention in the younger school children. Any plan or system that attempts to provide adequate service to the adult population, with the necessary amount of repair and restorative service involved, will to our mind find the dental profession, as its practice is now conducted, utterly unable and unprepared to meet the needs.

The problem, at the moment, constitutes what we believe to be one of the urgent necessities for organization on the broadest and most closely coordinated lines. And the cooperation and help of every ethical practitioner is needed if we are to preserve the integ-

rity of dentistry and continue its practice on the high plane proposed and projected by the high-minded leaders of the past few decades, and particularly those of the present day.

Another phase of dental practice which calls for closer coordination of effort, and one that definitely reflects the estimate which the public places upon dentistry as a health service, is the nation-wide effort now being made to regulate and control the ethical practice of dentistry through legislative enactments in practically all states. This represents a distinct effort on the part of dentistry to elevate and maintain its standards of ethics on the highest professional plane, and the sympathetic attitude of the public toward these endeavors represents a definitely tangible return from organized efforts that have been eminently successful; so much so, that the present organized state of dentistry is the envious ambition of practically every other profession.

An aspect of the legislative activities which have been so favorable to dentistry, and one that probably has not been properly evaluated, is the relation of the favorable attitude on the part of the public to the changing conception of our social responsibilities to the more improvident classes—and almost directly due to the activities and teachings in political, social, moral, economic and related fields.

In evaluating the substantiality of this developing appreciation of dental health service, let us not repeat the mistake made in the "boom" days, of attempting to test the measure of that appreciation on a purely financial basis, as represented by the wave of fee-raising that spread over the profession just before the depression period.

Another instance of immediate concern to the status of dentistry is the legislation now pending relating to the enlargement of the Dental Corps in the United States Army, noted in this issue by the Legislative Committee; and here, as in the original movement establishing the Corps, organized dentistry will play a most important part.

Our relations to the economic problems and questions under consideration are indeed serious, and demand organized consideration of ways and means of meeting what will most likely prove to be wider and more humanitarian obligation upon the profession.

As leading to a clearer understanding of organization, and possibly to a more intelligent consideration of the question, let us see just what organized dentistry should be interpreted to mean; the reasons therefor and the aims and purposes thereof from the point of view of the public, as well as from the point of view of the individual advantages for the dentist.

In accord with the Standard Dictionary's definition of "organization," organized dentistry may be defined as the representative members of dentistry constituted into a systematic union of its individual members working together for a common end; and that common end is the welfare and advancement of dentistry as a public health service, and of its individual members as units of that organization. These are the fundamental objectives upon which dentistry was established, and the objectives which have been kept steadily in mind during the entire evolutional development of dentistry from a craft to a scientific profession, a status that could only be attained, and one that can only be maintained, by a well-organized and well-coordinated body of intelligent professional men.

Organized dentistry, then, is the agency through which our present knowledge of dental practice has been coordinated and preserved in a systematic form most available and most valuable for the individual; it is the agency through which legislation for the benefit of its individual members has been enacted; it is the agency through which practically all advancement in methods and procedures of practice come to the individual; it is the agency which conserves the rights and privileges of the individual through its state and national organizations; it safeguards the traditions and the heritage that have come down to us from our predecessors, and it is the one agency through which our future may be assured.

These are but a few of the benefits that have come to us through organized dentistry, but let us impress the condition that these benefits can only come to the individual in proportion as he accepts his responsibilities and obligations to share the common cause.

United and organized, we can and will stand, but divided and disorganized, we may forfeit the benefits of the heritage of a grand and noble profession.

L. P. A.

ASSOCIATION ACTIVITIES

COMMITTEE ON LEGISLATION

THE Committee on Legislation presents the following brief survey of recent dental legislation and court action in the various states and in the United States Congress.

WASHINGTON, D. C.

H. R. 3491, a bill, presented in the House of Representatives by Congressman Collins of Mississippi, to provide for adequate dental service in the army was referred to the House Committee on Military Affairs.

A hearing on this bill was held on March 3, 1937, at which representatives of the American Dental Association appeared to urge enactment of this measure. While the War Department has recommended deferring action until a study of the needs of various chiefs of branches of the entire service is completed, vigorous support of the bill is assured by many influential members of the House and Senate and a recognition of the merits of this bill appears to be general. It carries a strong endorsement by the American Dental Association and all component state dental organizations.

As bearing upon the attitude of the Surgeon General toward the proposed legislation above referred to, the Committee presents a letter from the Chairman of the Committee on Legislation of the American Dental Association to the Surgeon General and the reply thereto.

March 12, 1937

Surgeon General Reynolds,
War Department,
Washington, D. C.

My dear General:

It would appear from statements that have recently appeared in certain Service Journals that a most unfortunate misunderstanding has arisen to the effect, the American Dental Association is considering a separation of the Army Dental Corps from the Medical Department of the Army.

This is so far from fact as to warrant an emphatic denial and I desire to state officially that such a proposal would be looked upon by the American Dental Association as most undesirable and furthermore not in accord with the opinion of the leaders in the dental profession, whose aim has always been and now is to promote an intimate and correlated relationship between the army Dental Corps and the Army Medical Department.

While it is true we are a distinct and separate profession and anxious to see dentistry accorded what we believe to be its proper and just due, we hold that the Army Dental Corps can function most efficiently only when the present relationship with the Medical Department is maintained. You may be assured our sole purpose in sponsoring the bill now before Congress, that would provide for certain improvement in the Army Dental service, is to promote a more efficient as well as an adequate dental service for the rank and file of the Army, with definitely no thought of seeking change in the present relationship of the

dental service as a unit of the Medical Department of the Army.

Your favorable attitude toward the Army dental health program and your sympathetic interest in this present problem is very deeply appreciated as is your invaluable assistance in the effort now being made to secure improvement in the Army Dental Service.

With kindest personal regards, I remain

Yours sincerely

(Signed) A. B. PATTERSON, *Chairman,*
Committee on Legislation,
American Dental Association.

WAR DEPARTMENT
OFFICE OF THE SURGEON GENERAL
WASHINGTON
March 15, 1937.

Dr. A. B. Patterson, Chairman,
Committee on Legislation,
American Dental Association,
Morris Building,
Joliet, Illinois.

Dear Dr. Patterson:

I was very much pleased to receive your letter of March 12, noting your earnest desire to continue the intimate and correlative relationship between the Army Dental Corps and the Army Medical Department and assuring me that it is not the intention of the American Dental Association to effect any degree of separation of these services.

I am sure that we are agreed on these points. I have in my time seen a really remarkable development in dentistry in the Army. I sympathize with the aspirations of the American Dental Association and the officers of the Dental Corps in obtaining more authority, a larger corps, and more adequate recognition of this important service and have done all I could to further these projects. The bill before Congress does not seem to set up a separate dental service but some of its provisions would involve or imply a degree of separation which would be undesirable, and I understand some of the testimony would seem to indicate that that was in the minds of some people whose desire for an increase in the Dental Corps has led them beyond the requirements of the dental service of the Army.

I am very glad to have your ideas expressed so clearly, which I always thought coincided with the opinion of the entire dental profession.

With kindest regards,

Sincerely yours,
(Signed) C. R. REYNOLDS,
Major General, U. S. Army,
The Surgeon General.

ARIZONA

A bill amending the dental law, to permit the regulating of dental advertising, was defeated in the legislature.

ARKANSAS

The Arkansas Dental Practice Act, as amended by the 1937 General Assembly, now compares favorably with modern dental laws in effect in a majority of the states. The amendments adopted provide "penalties for practice without license," "practice of dentistry defined," "practice of dental hygiene defined," "recording license with county clerk," "annual registration of license with board," "annual registration fee," "corporate practice prohibited," and "causes for revocation of license." The latter section empowers the examining board to revoke or suspend for any period of time any license issued to dentist or dental hygienist, and specifically provides that no license when once revoked shall ever be renewed. "Under cause for revocation," paragraph four prohibits, among other things, publication of claim to practise painless dentistry or claim of unusual skilfulness by dentist, associate, employee-dentist or dental hygienist; prohibits advertising professional superiority; prices; free dental work; guarantee; use of solicitors or advertising by radio, bill-board, neon sign or electric sign. An emergency clause declares the act in effect on adoption.

CALIFORNIA

More than forty bills relative to dentistry have been introduced in the present session of the legislature; of these comparatively few are endorsed by the California Dental Societies. Several of the bills entered relate to the California Compensation Act, to hospitalization and insurance, to voluntary health service insurance and medical service contracts. One would provide that a board of supervisors shall have power to adopt a system of insurance for the benefit of groups or all persons employed by the county, including life, health and accident. Other bills would "prohibit the operation of a clinical laboratory unless maintained by a licensed technologist, physician or surgeon," "codify the present dental practice act," "allow practice of oral surgery by dentists, physicians and surgeons only," "provide for appointment by governor to state board from list of three nominees by California State and Southern California State Dental Associations," "grant to board of examiners the power to regulate and register the number of offices one practitioner may operate," "provide for licensing X-ray laboratories, machines and technicians." Other bills refer to registration, unprofessional conduct, suspension or revocation of license, the advertising clause of the present dental act and reciprocity.

COLORADO

The Colorado Legislature has passed a bill placing a 2 per cent service tax on dental and medical services, including every other kind of service—hospital, mortuary, etc.

The people voted an old-age pension calling for $31,000,000, allocating 85 per cent of all sales, license and liquor taxes now or hereafter made effective; also an income tax that must be a replacement tax on real property. Arguments were ineffective, with nothing left to tax and the Supreme Court advising that it would not hold a service tax as a sales tax.

The dental law adopted in 1935 is effective and obeyed; no charges against violators have been necessary, and the profession is as nearly as possible 100 per cent ethical.

CONNECTICUT

Amendments to the state dental act, now before the legislature, prohibit a dentist from running more than one office unless he personally operates in each office; require that every clinic and dispensary be licensed and controlled by the State Dental Commission, excepting public school clinics, and prohibit all advertising of dentistry.

DISTRICT OF COLUMBIA

A modern dental law for the District of Columbia is now under consideration by the Commission.

GEORGIA

The dental law of Georgia was recently amended to grant authority to the board of dental examiners to suspend or revoke a dental license by majority vote of the board; to prohibit practising dentistry under a trade or a corporate name, or solicit practice by use of letters, publications, radio, displays, signs or any similar medium.

The word "advertising" was not mentioned in this bill; instead this law makes direct or indirect solicitation "unprofessional conduct," except in manner specified.

The act creating a public welfare board was amended to increase a membership of five to seven, with one member a dentist and one a physician. All social security legislation in Georgia will function through this board.

ILLINOIS

Bill now before the legislature amending the State Dental Act prohibits a

dentist from conducting, owning, maintaining or operating more than one dental office unless he shall personally supervise the work in each dental office at all times each such dental office is open.

INDIANA

By a recent decision of the Indiana Supreme Court, the constitutionality of the definition of the practice of dentistry was upheld, on all points raised, as to "one who owns or operates or conducts a dental office," "one who engages in practices included in the curricula of recognized dental colleges."

The Supreme Court held:

> The clause, "or engages in practices included in the curricula of recognized dental colleges," in our judgment is as much within the police power of the State to enact as any of the other provisions of the definition defining the practice of dentistry.

It is to be noted that the language used is "or engages *in practices* (italics ours) included in curricula." It does not refer to the subjects taught in the dental colleges, but to those things which are practised as provided in the curricula, which evidently mean the things practised in the dental clinic, such as operative, prosthetic dentistry, crown and bridge work, inlay work and orthodontia. When one is engaged in such practice, he would then be said to be practising dentistry under the definition. That this is the correct interpretation of said clause is clearly indicated by the further provision, "excluding dental students in dental college clinic work."

As to owning, operating or managing a dental office (without being a licensed dentist), the Supreme Court held:

> The profession of dentistry is not a business, but one of the learned professions which requires long years of study before one is capable of practising the profession. It is not a business where one can procure a manager to run the same. Before one may practise dentistry, he must pass a rigid examination and secure a license to practise. If a person alone or an association of persons who fails to have the necessary learning to pass the dental examination can own, manage or operate a dental parlor with a licensee in charge, then all the statutes regulating the practice of dentistry would be of no effect. The standards and ethics of the dental office, the class of workmanship and the price would be regulated by the owner or manager. The purpose of the dental statute is to prevent any one from practising dentistry who is not qualified and licensed, and any one who is not so qualified can neither directly nor indirectly practise dentistry. If one who is not qualified and licensed to practise is permitted to select and rent an office, and then employ licensed dentists to do the work, either upon a commission or salary basis, he would certainly be doing a dental business, and would be doing indirectly what he could not do directly. This provision of the statute is not applicable to one who is a duly licensed dentist. It is directed to those who are not, and is for the protection of the dental profession and the public.

This decision marks another important step in the strengthening of dental laws.

KANSAS

Amendments to the dental act were adopted by the 1937 legislature and signed by the Governor, April 2d. One amendment grants to the state board power to make such rules and regulations as are reasonably necessary to carry out and make effective the provisions and purpose of the dental act. This provision and another that stipulates that an order of the board shall be enforced until revised or modified by the courts, together with a further provision that limits the display of the name and title of a licensee, have strengthened the Kansas Dental Act, which was amended in 1935 to prohibit the corporate practice of dentistry and control dental advertising.

LOUISIANA

For violation of the dental act adopted in 1936, two offenders have been tried for illegal practice; both were found guilty and fined by the court. One fine of $200 was suspended on the defendant's promise to leave the State; the other fine of $100 imposed was paid by defendant. Legislature not in session.

MARYLAND

A bill designed primarily to control the advertising of dentistry successfully passed the Maryland legislature. A hearing before the House Judiciary Committee, slated as a hearing for opponents of the bill, drew an attendance of 150 members and friends of the Maryland Dental Association, with only four Baltimore dentists constituting the opposition.

MASSACHUSETTS

A bill is now in the legislature to eliminate commercial dental advertising in newspapers and by radio. At a hearing of this bill before the Committee on Public Health, 1500 dentists appeared in Gardner Auditorium in support of this particular legislative measure.

MICHIGAN

A bill is now in the legislature amending the present dental law to conform in general to the modern trend of the dental laws as enacted by more than forty states. The Michigan State Dental Society is confident the amendment will be adopted.

MINNESOTA

As a result of vigorous opposition on the part of the Minnesota State Dental Society, a bill was defeated which sought to repeal the 1935 dental act and permit corporation practice and uncontrolled dental advertisting. In District Court, the dental law which prohibits advertising a "specialty" by one in general practice was upheld and is now before the Supreme Court.

MISSOURI

A new dental law for Missouri was adopted unanimously by both House and Senate. One section of the bill that attracted considerable publicity relates to the control of advertising and prohibits the advertisting of "professional superiority," "prices," "statements tending to deceive or mislead," the use of glaring signs and the use of radio for directly or indirectly advertising professional qualifications or fees. This new law provides an excellent modern dental act for Missouri.

NEW JERSEY

A bill now before the legislature would make obligatory jail sentence for those found guilty of violence of the dental practice act when defendant shall refuse or fail to pay amount of judgment rendered against him in favor of the state board of registration and examination.

NORTH DAKOTA

An anti-dental-advertising bill amending the dental practice act was adopted by the legislature, signed by the Governor and goes into effect July 1, 1937.

OHIO

An attempt to amend the dental code to prevent dental college faculty members being appointed to the state board of dental examiners was defeated in the Health Committee of the House.

A permanent relief bill without provision for dental service is before the legislature; a Senate amendment to correct this omission is anticipated.

A bill to amend the optometry act, which might affect the corporate practice of dentistry, was indefinitely postponed; also bill to amend sections 13 and 14 of the Ohio dental law; also lien law bill relative to liens of physicians, dentists, nurses and hospitals for care and treatment of certain injured persons. House Bill 265, which provided for an occupational tax and a 3 per cent gross income

tax on professional service and professions, was defeated by a vote of 110 to 14.

OREGON

A referendum amendment to nullify the anti-advertising section of the Oregon dental law was decisively defeated at the November election.

PENNSYLVANIA

A bill was adopted by the State legislature in April that provides a modern dental law for Pennsylvania. This bill proposes to regulate the scope of practice of a dentist and a dental hygienist, provides additional causes for the revocation and suspension of licenses and registrations by prohibiting that type of advertising of a character now illegal in most of the states.

SOUTH DAKOTA

This new act, in general, appears to be in consonance with the trend of modern dental legislation. Violation of a provision of the act constitutes sufficient grounds for revocation or suspension of license by the board of examiners.

The act specifically prohibits corporate practice and regulates very adequately the advertising of dentistry. Points of interest are the restriction of the licensee to a door plate, name on building directory and use of his name in no more than three places upon windows of his office, and the limitation to a space, one column in width and one inch in depth, for publication in public print of name, address and telephone.

TEXAS

Two dental bills are now before the Texas legislature: One seeks to control the advertising of dentistry and to regulate professional conduct; the other empowers the dental board to suspend or revoke a dental license for cause, subject to appeal to the courts.

UTAH

A bill that proposed examinations in the basic sciences, conducted by a state examining board absolutely independent of the medical and dental boards or professions, for all seeking to practise healing in Utah was amended to exclude dentistry.

As previously reported in the JOURNAL, the attempt to nullify the anti-advertising provision of the state dental act by referendum amendment was not successful; this was followed by the introduction in the legislature of a bill with similar purpose and this was defeated in the Senate in March.

VERMONT

An act adopted by the legislature just adjourned, provides for the revocation of dental licenses for advertising prices, superiority, free or guaranteed service, prohibits electric or neon signs, hand bills, postal advertisements, letters or advertising offering free or guaranteed service by any medium whatsoever, including radio broadcasts.

WEST VIRGINIA

A bill amending the state dental law to control dental advertising was adopted in March by the legislature. The bill was fought bitterly by the advertising dentists, but passed in the House, 58 to 25, and in the Senate, 23 to 7. This provides a modern dental law for West Virginia.

WISCONSIN

The right of a dentist to use the title, Doctor, under the Wisconsin law was recently questioned in a malpractice suit; while the dental statute provided for the degree of "Doctor of Dental Surgery," the medical statute prohibited the use of the title, "Doctor," by one unless licensed to practise medicine and surgery or osteopathy.

To correct the conflicting statutes, an amendment to the dental act was adopted by the legislature, which entitles a licensed

dentist to use the title, "Doctor," or append to his name the words or letters "Doctor," "Dr.," "Doctor of Dental Surgery" or "D.D.S."

Several other bills relating to cooperative medical associations, group hospitalization plans, relief medical-dental care and a pure food, drug and cosmetic act are now before the legislature.

WYOMING

The state dental law has been amended to provide adequate control of dental advertising, increase former penalties for violations of the law and specifically empowers the board of examiners to revoke a license for unprofessional conduct. Laboratory technicians are prohibited specifically from doing or performing laboratory work except for dentists duly licensed to practise in Wyoming.

A. B. PATTERSON, *Chairman,*
Morris Bldg.,
Joliet, Ill.

CHARLES D. COLE, *Vice-Chairman,*
Washington, D. C.
C. J. BAUMANN, *Ex. Com.,*
Milwaukee, Wis.
R. O. ELAM, *Ex. Com.,*
Nashville, Tenn.
W. N. HODGKIN, *Ex. Com.,*
Warrenton, Va.
IRA C. BROWNLIE,
Denver, Colo.
E. RAY BROWNSON,
Los Angeles, Calif.
G. G. BURNS,
Rochester, N. Y.
C. O. FLAGSTAD,
Minneapolis, Minn.
J. D. HERTZ,
Stamford, Conn.
HARRY C. METZ,
Pittsburgh, Pa.
F. M. PURSELL,
Akron, Ohio.
A. F. WEEKS,
Portland, Oregon.
Committee on Legislation.

Atlantic City sky-line and beach.

BUREAU OF PUBLIC RELATIONS

CONGRESS OF ALLIED PROFESSIONS

THE outstanding feature of the 1937 meeting of the Minnesota State Medical Society was the afternoon and evening sessions devoted to the subject, "Are Health Services Adequate and Available in the United States?" Representatives of medicine, dentistry, nursing, pharmacy, hospitals and the Children's Bureau of the Department of Labor were invited to speak on various phases of the subject.

Reporting the meeting, Dr. I. A. Epstein, Chairman of the Economics Committee of the Minnesota State Dental Society, said: "The Congress of Allied Professions, presented in St. Paul by the Minnesota State Medical Society, gave our committee its first opportunity to hear all sides of this social question.

"The discussion, devoted to the nation's health problems, was held in the Auditorium Theater, and was attended by physicians, nurses, dentists, pharmacists and physiotherapists.

"Both the liberal and conservative attitudes were expressed, and we are indebted to the medical society for bringing together such notable representatives for our enlightenment."

Dr. Martha M. Eliot represented the Children's Bureau; Dr. Maxwell J. Lick, the American Medical Association; Dr. E. H. Bruening, the American Dental Association; Dr. C. R. Rorem, American Hospital Association; Miss Olivia Peterson, R. N., and Miss Daisy Dean Urch, R.N., the nursing profession, and F. W. Mondry, the Pharmaceutical Association.

Americans, observed Dr. Rorem, need to be better educated to the value of good health services. Nearly half a billion dollars a year is wasted on medicines of doubtful value and services of non-medical healers.

"About 4 per cent of the national income goes for health services." "Approximately three billion dollars was spent in 1936, and this probably was not enough for a nation to pay for preserving and protecting health."

Physicians' fees represent only 30 per cent of the total cost of health service, Dr. Rorem reported. Hospital services represent 25 per cent; drugs, 20 per cent; dentistry, 13 per cent; nurses, 5 per cent; public health, 3 per cent, and other services, 4 per cent.

"America could pay the costs of health services more easily by wider use of group budgeting through taxation and insurance," he added.

Dr. Rorem asserted the people could get more health for their money by:

1. Spending proportionately more for prevention and less for cure.
2. Diverting money now being spent for patent medicines and quacks to the purchase of scientific diagnosis and treatment.
3. Reducing overhead costs by group practice of allied professions in community-owned hospitals.
4. Emphasizing the social, as well as clinical, aspects of health service in training practitioners and developing hospitals.

Dr. E. H. Bruening, Chairman of the Committee on Economics, American Dental Association, stated that America's present dental facilities are adequate to take care of children's dental needs, but that the public as a whole, either through lack of understanding or lack of knowledge of the necessity, do not avail themselves of the existing service. Present facilities are not adequate to care for all adult dental needs. However, a large percentage of our adult population who could well afford to do so do not avail themselves of the dental services which are at hand. Many adults neglect their mouths for other reasons besides lack of funds, namely, inconvenience, lack of education, fear and a preference for other commodities.

Nursing needs of many communities are not met because of lack of properly trained nurses, Daisy Dean Urch, of Winona, said at the Monday afternoon program of the Congress.

"From a nursing standpoint, quite as much as from the medical, dental, social and economic, truth compels me to admit that health services are neither sufficiently adequate nor available," said the president of the State League of Nursing Education.

Speaking on the same program, Miss Helen Beckley, of Chicago, director of social services in the Cook County Hospital, said: "As surely as public education demands increasing public health measures, standards of personnel and practice must be so protected as to make available the highest quality. It also means a never-ending educational program in order to keep the public so informed that there will be demanded the best professional personnel and practice."

Pharmacists, Dr. Charles H. Rogers, of the University of Minnesota, at the afternoon meeting, said, are "becoming profession-conscious."

"When pharmacists who are qualified by training and experience become conscious of their professional responsibilities," he said, "their contributions to a more perfect health service will increase greatly."

Both Dr. Epstein and Dr. Bruening felt that the meeting was a decided success and recommend that other state societies follow Minnesota's example by holding similar meetings in the future.

DENTAL HEALTH PROGRAM KANSAS CITY, MO.

THE public school dental health program is under the direction of the Health and Physical Education Department in cooperation with the Dental Hygiene Committee of the Health Conservation Association.

The children in the kindergarten and first three grades and those in special schools are examined each year by dentists. Notices are sent to the parents of all the children examined, requesting that the child be taken immediately to the family dentist for care. In the event that the parents of the child cannot afford to pay for the service, the school nurse, after careful investigation, takes the child to one of the dental clinics.

There are four school clinics in operation. The central clinic has four chairs; the other three have one chair each. Two of the clinics are operated on a part-pay basis; the children pay fifty cents per visit. The other two clinics are operated on a free basis. Over half the children

attending the clinics are treated free. Last year approximately 10,000 children received dental care at the four clinics. The Board of Education furnishes the space, electricity and heat; it also pays the salaries of the examiners and supervisor. The clinic service deficit is paid each year from a private trust fund that has been in existence since 1914.

Each year all grades are given dental health education by means of lectures, exhibits, motion-pictures and special projects which have been prepared for the age level of the different children. The 100 per cent room is emphasized, and a special honor chart is given each room as soon as all the children therein have their mouths in 100 per cent condition. The teacher is a vital factor in promoting this phase of the work and the teachers' interest is evidenced by the fact that each year several hundred "Good Teeth Honor Room Charts" are placed in the schools. This year the special project for the children in the older grades and for the members of the Parent-Teacher's Association was the story of malocclusion.

The public school dental clinics are supplemented by a number of private clinics that are doing splendid community service: the Kansas City-Western Dental College, Mercy Hospital and a number of charitable agencies where public-spirited dentists volunteer time for this splendid service.

When this work was started in 1914, there was an average of six cavities plus, per child in the grades, with 98 per cent needing attention, with no fillings in the teeth at all. Now the first three grades average about one cavity per child, with over 65 per cent *good teeth*, and the upper grades average over 75 per cent *good teeth*, with all dental work completed.

A.D.A. RADIO BROADCASTS OVER COLUMBIA NORTHWEST AND SOUTHWEST CHAINS

THROUGH the cooperation of the Columbia Broadcasting System, the American Dental Association's weekly radio programs are being made available, to the following stations, at 12:15 p.m., Central Standard Time.

*KNOW—Austin, Texas
*KRLD—Dallas, Texas
*KTRH—Houston, Texas
KLRA—Little Rock, Ark.
*KOMA—Oklahoma City, Okla.
*KTSA—San Antonio, Texas
*KWKH—Shreveport, La.
*KTUL—Tulsa, Okla.
*WACO—Waco, Texas
KGKO—Witchita Falls, Texas
*KFH—Wichita, Kans.
WIBW—Topeka, Kans.
WOC—Davenport, Iowa
WCCO—Minneapolis, Minn.
WNAX—Yankton, S. D.
KSCJ—Sioux City, Iowa
KFAB—Omaha, Nebr.
WTAQ—Green Bay, Wis.
WISN—Milwaukee, Wis.
WMBD—Peoria, Ill.
*KRNT—Des Moines, Iowa
WKBB—Dubuque, Iowa

*These stations are now using our programs.

SUBJECTS AND DATES FOR THE COMING MONTH

June 1: Dr. W. H. Kennicott—Chicago's Pioneer Dentist
June 8: The Beginning of Organized Dentistry
June 15: Every Cloud Has A Silver Lining
June 22: Vulcanite Dentures
June 29: The Discovery of Nitrous Oxide or Laughing Gas

MICHIGAN STATE AND DETROIT DISTRICT DENTAL EXHIBIT

DETROIT'S famous "Little World's Fair" drew an attendance of 374,000 people this spring. Officially known as the Detroit-Michigan Exposition, this annual ten-day show is composed of all types of educational, health, scientific and commercial exhibits.

Dental exhibit at the Annual Detroit-Michigan Exposition, April 2-11, 1937.

The Michigan State Dental Society and the Detroit District Dental Society occupied a forty-foot booth in which they displayed the story of dentistry. The accompanying illustration is presented in the hope that it may stimulate other dental societies to follow Michigan's example. Dr. F. G. McGuigan, Exhibit Chairman, says:

"I am thoroughly convinced that organized dentistry is missing a wonderful opportunity by not exhibiting at all functions, such as state and county fairs, health shows, builders' expositions and so forth. Thousands would receive dental information of the right kind from the right source."

DENTAL ECONOMICS

$293,983.85 INCOME: ARE WE GETTING OUR MONEY'S WORTH?

By E. H. BRUENING, D.D.S., F.A.C.D., Omaha, Nebr.
CHAIRMAN, COMMITTEE ON ECONOMICS

THIS presentation is an effort to describe briefly the activities of the American Dental Association and to show what it is doing to justify its existence and the expenditure of its funds.

Each activity has been considered, along with its cost to the Association. The figures used are from the Report of Audit for the year ending June 30, 1936.

The head of each activity was asked to submit a statement to justify the expenditure of the funds allotted to his group.

Two hundred ninety-four thousand dollars is a large sum of money. Judicious use of it should assure some excellent results. Let us see how it was obtained and how it was expended.

The income was derived from the following sources: membership dues; sale of exhibit space; fees collected by the National Board of Examiners; rentals and sales by the Library Bureau; sale of Christmas Seals; sale of "Accepted Dental Remedies"; sale of advertising space in THE JOURNAL; earnings from investments; sales by the Bureau of Public Relations; sale of Dental Index, and income from the Cleveland Property.

The various groups, known as boards, bureaus, commissions and committees, will be considered separately. Whether or not they received funds, the results of their activities are either assets or liabilities to the Association and to the profession as a whole.

THE HOUSE OF DELEGATES

The House of Delegates is the governing body of the American Dental Association. During the last fiscal year, it consisted of 230 members.

Every constituent society, regardless of how few members it may have, is entitled to one member in the House. If there are more than 100 and less than 300 members, the society is entitled to two representatives. A membership of 300 allows three delegates, and one delegate is added for each 200 additional members.

The Officers of the Association are the Officers of the House.

Trustees and former Presidents are members of the House without the right to vote.

The legislative powers of the Association reside in the House of Delegates, which transacts all the business of the Association, public, professional and scientific, not otherwise provided for by the By-Laws. No appropriation is made for the expenses of a Delegate, and unless he receives reimbursement from his society, he must pay his own expenses.

(Read before the Section on Dental Economics at the Seventy-Third Annual Midwinter Clinic of the Chicago Dental Society, February 16, 1937.)

Even with careful planning, the meetings of the House of Delegates must take a considerable amount of the Delegate's time away from the scientific sections. Consequently, these men must make a considerable sacrifice to attend to our business, which is to promote jointly the interests of dentistry and the dental welfare of the public.

THE BOARD OF TRUSTEES

The Board of Trustees consists of one representative for each of the thirteen Districts into which the country and its possessions have been divided. Each Trustee is chosen by the Delegates, who represent each state or territory. There are about twenty delegates for each District.

The four Officers of the Association are Officers of the Board without the right to vote.

The Board holds two regular meetings each year, one in the Central Office in midwinter and the other at the time and place of the Annual Session of the Association. An Ad Interim Committee is always prepared to look after matters which may require immediate attention.

The Board, which functions very much like a board of directors of a big business, has charge of all properties and financial affairs, subject to the approval of the House of Delegates. This means much responsibility and supervision over a great many activities. The duties are heavy and require three or more days of hard work during each of the Sessions and much additional time and work throughout the year.

The budget allowed was $4,100, of which $467.75 was not spent. Most of this was used *per diem*, as each member is allowed an amount for each day only sufficient to cover his traveling and hotel expenses.

The proceedings of the Board are published annually.

THE PRESIDENT

The duties of the President are very heavy. Many state and local society officers believe that his presence at their meetings assures a good attendance, and choosing the ones where the greatest good can be accomplished is a difficult task. For him to accept all invitations is impossible, for obvious reasons.

Considerable leeway is and should be allowed the President in his traveling program. He is allowed $1,000 as an honorarium, and about an equal amount for the actual expenses of his office. His sacrifice of time and energy in the interest of the Association must necessarily amount to quite a sum of money if it could be reduced to this commodity.

THE SECRETARY AND BUSINESS MANAGER'S DEPARTMENT

The Appropriation for the Secretary and Business Manager's Department is $29,500 (unexpended balance, $3,517.05).

The chief items of expense are the salaries of five persons, $18,000; rent and maintenance of office space, $4,200; auditing, $1,000, and miscellaneous items, $3,000.

THE GENERAL SECRETARY

The General Secretary is elected annually by the House of Delegates. Among his many duties are the verification of the credentials of the Members of the House of Delegates; collection and transmission of all dues to the Treasurer, and preparation for publication of the official program for each Annual Session.

He is an ex-officio member of the Research Commission.

He must arrange the program for the Annual Conference of State Society Officers.

He must prepare for publication the

"Events Bulletin" for each Annual Session.

The Bureau of Public Relations, Library Bureau and the Bureau of Chemistry are under his direction.

He aids in the work of increasing membership and the sale of Christmas Seals, and is in charge of transportation matters.

He is the executive head of the Central Office and has jurisdiction over twenty-two of its employes.

He is a member of the Committee on Dental Health Education and the Committee on Process Patents.

He is the secretary of the House of Delegates and of the Board of Trustees.

THE BUSINESS MANAGER

The Business Manager is under the direction of the General Secretary and reports to the Board of Trustees.

He is in charge of the printing, circulation and advertising and the sale of the mailing list of THE JOURNAL.

He is the purchasing agent and manager of the office building.

He acts with the Treasurer in the investment of funds.

He is in charge of the sale of exhibit space and arranges contracts with commercial organizations for the Annual Session.

He is in charge of the cashier and bookkeeping departments.

He is the budget officer of the Association. He handles all business matters connected with the sale of Christmas Seals.

THE BUREAU OF PUBLIC RELATIONS

The Bureau of Public Relations, which has its headquarters in the Central Office, under the direction of the General Secretary, has charge of all materials and methods for dental health education, contacting the laity and cooperating with national organizations dealing with health problems.

The sum of $17,000 was appropriated for this important work.

The Bureau added seven new pamphlets, three educational charts and eight exhibits to its stock of materials last year. The adult educational charts consist of a series of eight sheets, spirally bound, to form a unit. Each sheet is 22 by 29 inches in size, and the illustrations are in five attractive colors.

To supply the need for more adequate dental display material, the bureau has added eight exhibits to its collection. These are rented to dental societies. Two are electrically motivated exhibits, showing the progress of decay and the progressive stages of pyorrhea.

In September, the Bureau arranged with the Columbia Broadcasting System for a series of twenty-seven fifteen-minute radio programs over its "Northwest Chain," which consists of eight stations, covering Indiana, Illinois, Wisconsin, Minnesota, North Dakota, South Dakota, Montana, Nebraska, Wyoming, Iowa, Missouri and Kansas. This territory has a population of about 25,000,000. Columbia now releases these radio talks over its Midwest System, which consists of twenty stations, covering the entire middle west from the Canadian border to Texas and Louisiana.

It also broadcasts during a fifteen-minute period each week, over station WBBM Chicago, which covers the east, central and south central states. Plans are under way to inaugurate a nation-wide system of dental broadcasts under the jurisdiction of the A.D.A.

A new motion-picture, "Betty's Crooked Teeth," and fifty-two stereopticon slides were added to the visual education circulating library.

By an arrangement with Walt Disney, the Bureau has developed and now has

for distribution Mickey Mouse dental health material, consisting of a Mickey Mouse clean tooth certificate, a Mickey Mouse good tooth button and a Mickey Mouse dental honor roll.

The Bureau furnished models, plaques and other exhibit material to the expositions held at San Diego, Calif., Dallas, Texas, and Cleveland, Ohio. Dental exhibits were loaned to fifty-four dental societies. It prepared a number of exhibits showing the activities of the A.D.A. and displayed them at thirty state society meetings.

Six thousand and eighty orders for educational material were filled during the year. Approximately 200,000 separate items were distributed.

The Bureau income from material sold during the twelve months of 1936 was $8,696.90. When this amount is deducted from the 1936 budget, the cost of the Bureau for the year was approximately $8,000.

The Bureau keeps in close touch with the Health and Safety Committee of the Boy Scouts of America, the 4-H Clubs and the National Congress of Parents and Teachers, of the advisory committee of which the Supervisor of the Bureau is a member.

The Supervisor is also a member of the Technical Advisory Committee of the Joint Committee on Health Problems in Education, and a member of a committee to establish closer relations between the American Dental Association and the American Public Health Association.

The Bureau is in charge of the Health and Scientific Exhibit Section of the Annual Session of the A.D.A.

The Supervisor acts as secretary of the Committee on Economics.

The chief items of expense are: salaries, $6,700; printing, $4,600; rent, $1,000; depreciation, $900. Miscellaneous items bring the total expenditures to an amount leaving an unexpended balance of $664.21.

THE LIBRARY BUREAU

The Library Bureau is under the direction of the General Secretary.

It contains 3,300 dental and medical books and about 1,000 package libraries, covering 300 subjects. A member of the Association may borrow these books and packages. There is no charge for borrowing books, but a $2 deposit is required for each book shipped. There is a 50 cent rental fee for each package library, which is a collection of about thirty clippings and reprints on special dental subjects. Lists of the books and package libraries can be obtained on request.

During 1936, 2,210 books were circulated, and 1,385 package libraries were mailed out. In all, over 43,000 articles were borrowed in addition to the books.

Nearly 400 members use this service each month. They borrow books and package libraries and also request answers to specific questions. These answers may be in the form of a few articles or typed excerpts or other typed information, such as names, dates and completion of references.

A total of 166 magazines are received currently, of which 116 are in English.

The appropriation for the year was $6,800 ($273 unexpended).

THE TREASURER'S DEPARTMENT

The Treasurer's Department, the finance department, is closely associated with the Secretary and Business Manager's Department. It is responsible for the handling of all funds of the Association, after they have been collected from the various sources.

The judicious investment of moneys not needed for immediate use is one of its most important functions. It is under the direct supervision of the Treasurer, who

is aided in this work by the Business Manager and the Budget and Finance Committee. The latter is made up of three members of the Board of Trustees who make it their business to know financial conditions as well as how the funds are to be used when a budget request is received. The By-Laws give this committee authority to employ, when necessary, investment council, which shall not be affiliated with a security selling organization.

All the income of the Association is deposited in a bank designated by the Board of Trustees. All expenditures of the Association are made by check against the account in the designated bank. All checks must be supported by a voucher, which is scrutinized by the Cashier, Business Manager, Secretary and Treasurer. All checks are signed by the Treasurer and countersigned by the General Secretary.

Monthly trial balances, semi-annual audits, duplicate deposit slips, monthly bank statements, consecutively machine-numbered checks and countersigned vouchers are safeguards in the handling of the Association's funds.

The Association has four special funds which are under the Treasurer's custodianship. These funds must not only be kept intact but also must be invested in interest-earning securities. June 30, 1936, these special funds amounted to over $600,000. (See "Balance Sheet" 1936, Transactions, p. 158.) The task of caring for these funds is an important responsibility, especially during strenuous times.

COUNCIL ON DENTAL THERAPEUTICS

The Council on Dental Therapeutics is composed of ten members. Five are dentists, two have medical degrees and five have the Ph.D. degree. The Editor and the general Secretary are ex-officio members.

Briefly, its duties are to pass upon the therapeutic claims for proprietary remedies.

It regularly publishes reports of its findings in THE JOURNAL.

It has compiled these reports and recently published them in book form under the title "Accepted Dental Remedies." Two printings of this book have already been sold, and the project has shown a profit of over $1,000. The book is getting a wide distribution and is being used in many of the dental colleges of the country.

The Council's budget appropriation was $15,342, which includes the appropriation for the Bureau of Chemistry. Most of the time, there were three employes. Salaries amounted to $7,000.

Printing of the book "Accepted Dental Remedies" cost about $2,000 for 5,000 copies; rent and maintenance, $2,500; depreciation was $600 and such other items as traveling, postage, insurance and supplies practically consumed the remainder of the budget allowance.

The secretary of the Council is also director of the Bureau of Chemistry.

BUREAU OF CHEMISTRY

The Bureau of Chemistry is housed on the top floor of the Central Office building. Here, the laboratory work required by the Council is carried on. This is also the office of the Council. The Bureau is under the jurisdiction of the General Secretary.

The Bureau of Chemistry investigates the composition of medicinal articles of interest to the dental profession.

Since the New Orleans report, about fourteen proprietary articles have been examined by the director in the laboratory. Among them are the solutions for cold sterilization, a number of pyorrhea remedies of questionable value, stain removers containing hydrochloric and citric

acid, pulp capping material and topical anesthetics.

This work is always in coordination with and under the direction of the Council on Dental Therapeutics.

ANNUAL SESSIONS

For the Annual Session, $27,900 was appropriated, of which $25,500 was used. This expense covers the cost of a field secretary, who establishes an office in the convention city about six months prior to the annual meeting, working with the Local Committee on Arrangements to complete the plans and make the necessary arrangements for the meeting, at all times representing the A.D.A. in all negotiations, and reporting to the General Secretary and Business Manager.

Entertainment features, building exhibit booths, arranging meeting rooms, health and scientific exhibit space, tables and other equipment for clinics, police service, the expense of badges, publicity, traveling and transportation, insurance and many other items consume the appropriation.

The business connected with the Annual Session is handled by the Secretary and the Business Manager.

Against this cost is a credit of $23,000, derived from the sale of exhibit space.

THE LOCAL COMMITTEE ON ARRANGEMENTS

The Committee on Local Arrangements is selected by the dental society of the city in which the meeting is to be held.

The chairman is in close contact with the General Secretary and Field Secretary and reports to the Board of Trustees.

This committee has charge of certain appropriations made under the heading of Annual Sessions.

SCIENTIFIC SECTIONS

To facilitate their presentation, the programs of scientific subject matter are divided into eight "Sections," as follows:

1. Operative Dentistry, Materia Medica and Therapeutics
2. Full Denture Prosthesis
3. Partial Denture Prosthesis
4. Oral Surgery, Exodontia and Anesthesia
5. Orthodontia
6. Children's Dentistry and Oral Hygiene
7. Histology, Physiology, Pathology, Bacteriology and Chemistry (Research)
8. Periodontia

Each Section has a chairman, vice chairman and secretary. The chairman and secretary procure the essayists for the meetings of their section. The secretary sends the General Secretary, at least forty days prior to the date of meeting, a copy of his section program.

Each section has an executive committee of three members, consisting of the last three retired chairmen. This committee passes on all papers read before the Section and endorses for publication only those of scientific or practical value.

Each Section may make nominations for honorary and associate memberships in the A.D.A.

THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION

Publication of THE JOURNAL, which represents the largest item of expense, will be considered at some length.

The cost of the twelve issues of THE JOURNAL was, for 1936: printing, $36,000; postage, $8,000; cover paper and wrappers, $3,000; salaries of editors and their staff, $17,000; paper, $21,000; office rent, $4,000; cuts, $4,000; other expenses, about $2,000; a total of $95,446.54. This

covers an average of 42,000 copies a month, at a cost of $8,000 an issue, or nearly 20 cents per copy.

The recent increase in cost of paper will increase the JOURNAL cost by about $3,500 for the same number of copies, which was 504,000 for last year.

The acquisition of *The Dental Cosmos* will increase the cost of publication.

The income from sale of advertising space was $54,000.

The rate per page for one issue is $140. A contract for twelve issues reduces this to $112.20. The rate charge for advertising space is regulated by the circulation figure.

The policy of the Association excludes from the JOURNAL pages the advertising of products not accepted by the Council on Dental Therapeutics. As many of these are products of large advertisers, the field from which advertising may be solicited is much limited.

There were over 250 papers published during the year. Ninety-four papers read at the St. Paul meeting were printed and seventy-three of the New Orleans papers have appeared thus far.

The "Beneficial Circle."—By this plan, the dentist buys from those who advertise in THE JOURNAL, thereby increasing the advertiser's profits. This in turn will encourage and increase advertising; which will produce more revenue for the Association, to be used for dental health education. The public in turn will recognize its need for dental service, the dentist will buy more material and the advertiser will again realize more profit from the increased sales of his products.

The third annual report on the "Beneficial Circle Plan" shows that it has been an important factor in the distribution of nearly a million pieces of dental educational material to the general public.

A check-up indicates a healthful annual increase in the number of pages of advertising during the last three years, especially when compared with two dental publications with larger circulation.

THE COMMITTEE ON DENTAL HEALTH EDUCATION

The Committee on Dental Health Education has five members, one of whom is the General Secretary of the A.D.A., who is also the secretary of the committee. The office of the committee is the Central Office. Its purposes are: to disseminate public instruction; to promote public health, and to assist the Committee on Dental Legislation to obtain legislation pertaining to mouth hygiene and public instruction.

This Committee is in close contact with the Bureau of Public Relations, through which its publications are distributed.

THE COMMITTEE ON THE NATIONAL MUSEUM OF DENTISTRY

The Committee on the National Museum of Dentistry consists of ten members, particularly familiar with oral diagnosis, oral surgery, pathology, etc. The curator of the Army Medical Museum and the officer of the Dental Corps who is in charge of the dental division of the museum are ex-officio members of the committee. The latter is the secretary.

There are great possibilities for development of scientific activities through this museum. The committee suggests that a consultation service by mail could be developed through the registry of the museum.

Five exhibits were prepared and loaned to various organizations for dental health exhibits. One was sent to the San Francisco meeting.

THE COMMITTEE ON PUBLIC HEALTH

The duties of the Committee on Public Health are to develop dental programs

suitable for public health organizations, state, city or local, and to work in cooperation with the U. S. Public Health Service, the Association of State and Territorial Health Authorities and the various state and city health departments, to stimulate interest in public health activities.

The U. S. Public Health Service and its Surgeon General have cooperated very generously with the A.D.A. in its efforts to improve public health.

There are five members on this committee, nominated by the Board of Trustees and elected by the House of Delegates.

THE COMMITTEE ON LEGISLATION

The Committee on Legislation shields the profession against unjust laws. Its appropriation was $3,500. One thousand one hundred dollars was used for the salary of a dentist attorney to study and tabulate the dental laws of the country. He also acted as secretary *pro tem* of the committee. Traveling expense was $700 and stenographic service, $500. There were the usual expenses for miscellaneous items.

The committee is composed of thirteen members. It has one member for each District, nominated by the Trustee of the District and elected by the Board. It also has a deputy for each state.

The committee drafted a congressional bill embodying the recommendations of the A.D.A. as relates to the Army Dental Corps. This was submitted to the Surgeon General of the Army for approval. It provides for the rank of brigadier general for the chief dental officer and increases the number of dental officers to one to each 500 total army strength, which is a regulation in the U. S. Navy.

The question of mail order dentistry received attention, and the Federal Trade Commission and the Post Office Department have shown a determined effort to rid the country of this particular fraudulent practice.

The committee has cooperated with states requesting aid in improving their dental laws. It has cooperated with Missouri and Illinois to stop some particularly obnoxious advertising.

Formal objections were entered to the National Housing Act in a telegram to the administrator, but subsequent activity made it unnecessary to pursue this objection.

THE MEMBERSHIP COMMITTEE

The Membership Committee is composed of thirteen members organized under a plan similar to that governing the economic and legislative committees.

Its appropriation was $1,484, of which only $1,056 was used. The business of this committee is handled through the Central Office, where $700 is used for salaries, $150 for postage, and the balance for miscellaneous expense.

Of the practicing dentists, 70 per cent are now members of the A.D.A. This is a good record when compared with about 56 per cent for the American Medical Association and about 15 per cent for the American Bar Association.

Of the practicing dentists, 10 per cent are ineligible or too old, about 12,000 prospects remaining for membership in the Association.

NATIONAL BOARD OF DENTAL EXAMINERS

The National Board of Dental Examiners, which was organized in 1928, consists of fifteen members plus the Surgeon General of the Army, Navy and Public Health Service, who are ex-officio members.

The purpose and duties are to cooperate with state boards of examiners to determine the preparedness of candidates for the practice of dentistry. Over 200 candidates have successfully completed

Parts I and II of the examination and have received the "Certificate of Qualification."

Eleven states have amended their state dental laws to permit recognition of the National Board Certificate.

The National Board of Dental Examiners was organized after years of consideration, by dental examiners, dental educators and the American Dental Association as the most practical answer to the widespread request for some means by which dentists might change their location from one state to another without repeating all the examinations. Each state board reserves the right to conduct examinations in the practical subjects.

The examinations of this Board are divided into two parts. Part I includes the subjects which are usually completed in the first two years of the dental curriculum and is open to all candidates who have completed that part of their dental education: Part II includes the third and fourth years of the curriculum and is open to all candidates who have successfully passed Part I.

The examination fee is $10 for Part I and $15 for Part II.

The rulings of the board must be approved by the three national organizations from which its members are selected: the American Dental Association, the National Examiners Association and the Association of Dental Schools.

All fees collected are paid to the Treasurer of the American Dental Association and credited to the General Fund. All expenses are paid by the A.D.A.

COMMITTEE ON DENTAL INDEX

The Committee on Dental Index is a standing committee of five members, nominated by the Board of Trustees and elected by the House of Delegates. Of a budget of $8,900, $4,500 was used for salaries and $2,800 for printing. Income from sales amounted to about $1,500.

This committee is in charge of indexing all articles on dentistry in dental periodicals published in the English language in the United States, England, Canada, Australia, South Africa, India and other countries.

The need for a dental index was first called to the attention of the dental profession in a paper by Arthur D. Black, read before the Institute of Dental Pedagogics, in St. Louis in 1908. A dental index bureau was formed which published the first volume of the Dental Index, covering the years 1911-1915. The A.D.A. contributed to this work in 1920 and soon after assumed financial responsibility for this project. All dental literature has been indexed to date.

Members of the A.D.A. who wish to write a paper or review the literature on a particular subject will find copies of the Index in a good library or can secure lists by writing to the Library of the A.D.A.

Copies of the Dental Index are for sale by the Central Office.

THE JUDICIAL COUNCIL

The Judicial Council has five members. Its principal function is to interpret the Code of Ethics of the American Dental Association.

Among the questions handled during this year, which are typical, were:

Inquiries from state societies seeking information regarding types of signs and size of lettering.

Inquiries as to whether a member can ethically give lectures and clinics for manufacturers of dental materials, and regarding newspaper advertisements.

The matter of contracts between patient and dentist, between corporations and dentists, and the legality of dental clinics.

Requests for information regarding or-

ganization of dental clinics and dental hospitals.

Appeals from a decision of a state society on the basis of an unfair trial.

Inquiries regarding the legality of expulsion of members from components of the American Dental Association.

Questions involving telephone directory advertisements; ethics of dental directories; patenting dental articles; dentists' owning stock in medical and other companies; giving testimonials; and allowing one's name to appear on patented articles.

The budgetary requirements of this council are small, though the work is important and far-reaching. The $285 allowed was just about used.

THE DENTAL EDUCATIONAL COUNCIL

The Dental Educational Council is composed of seven members, three representing the American Dental Association; two, the American Association of Dental Schools, and two, the Association of Dental Examiners.

The office of the secretary of the Council is located in the Central Office of the American Dental Association.

This council was formed in 1909. In 1918, it made its first classification of dental schools. Fifty-eight were inspected and forty-seven were classified: fourteen in Class A, two tentatively in Class A, twenty-six in Class B and five in Class C.

Of the forty-seven schools classified, eighteen have either been discontinued or have been merged with universities.

The Carnegie Foundation for the Advancement of Teaching was a potent influence in bringing about important changes. After the inspection of all schools by Dr. Gies (for the Carnegie Foundation), a new classification was published.

In 1931, the council developed a dental student register similar to that of the Council on Medical Education and Hospitals of the American Medical Association. This has been influential in improving the status of predental education.

Medicodental relationships were strengthened by the American Medical Association's accepting the invitation of the council to appoint a representative to serve on this council in an advisory capacity.

The appropriation for this activity was $2,000, of which practically all was used, largely for the student register plan.

THE COMMITTEE ON DENTAL EDUCATION

The Committee on Dental Education consists of three members. It is charged with the following important duties:

1. To represent the American Dental Association on the Dental Educational Council.

2. To suggest to the Board of Trustees, means and methods by which the American Dental Association can best improve dental education.

3. To organize, subject to the approval of the House of Delegates, a committee on nomenclature, the members to include representatives from each of the specialties of dental practice. The editor shall be an ex-officio member of this committee.

4. To organize a committee on history, to be composed of three members.

5. To organize a committee on dental museum, made up of ten members. The curator of the Army Medical Museum and the dental officer in charge of the Dental Division of the Museum are to be ex-officio members of this committee.

The appropriation was $500, with an unexpended balance of $46.48. Nearly all was used for traveling.

THE COMMITTEE ON DENTAL HISTORY

The Committee on Dental History was organized by the Committee on Dental Education, and is composed of three

members. It seems that no definite duties have been prescribed for this group and this may be interfering with its functioning.

Records have been compiled over a period of years listing memorials, tablets, paintings, etc., of men and incidents relating to the profession, that have been placed in colleges and other buildings.

A carefully prepared authentic history of the origin, works and advancement of dentists and dentistry is essential and should receive the whole-hearted support of the members of the profession.

COMMITTEE ON NOMENCLATURE

The Committee on Nomenclature consists of eight members, organized under the direction of the Committee on Dental Education. The following specialties are represented on the committee: exodontia, oral surgery, periodontia, orthodontia and prosthodontia.

This committee was first organized in 1922, and has always been under the direction of its present chairman.

Efforts have been made to adopt a nomenclature that conforms with the Basle Anatomical Nomenclature.

The Committee contemplates the publication, in pamphlet form, of all the terms suggested over the years and believes that by this means those interested can be made more familiar with the recommendations and be more impressed with the necessity of a standardized nomenclature.

THE DENTAL RELIEF COMMITTEE

The Dental Relief Committee is a standing committee, consisting of five members, who are nominated by the Board of Trustees and elected by the House of Delegates. The board names the chairman and secretary of the committee.

The committee selects one member from each state society to cooperate in the solicitation of relief funds within the state where he is a member. These are known as associate members of the Dental Relief Committee.

The duties of this committee are to stimulate interest in the Relief Fund, to devise measures of increasing contributions to the fund and to help the local committees with this work.

Budgetary funds are now taken from the Relief Fund.

The importance of this work is demonstrated by the fact that the actual market value of the securities in the Relief Fund on June 30 was $366,797.50. The total credits including accrued interest brought the net total to $377,908.46.

This year, the Army Dental Corps averaged $1 per member.

THE DENTAL RELIEF COMMISSION

The Dental Relief Commission is composed of five members whose duties are to investigate and pass upon all applications for relief.

During the New Orleans meeting (1935), changes were made in the Relief Commission rules, whereby 50 per cent of the contributions of a state were to be returned to that state for its own relief fund. Over forty states have qualified under this regulation; which materially broadens the field for aid to deserving dentists and in certain cases to widows and families provided application is made within sixty days after the death of the member.

Every member has a possibility of getting back, through the Relief Fund, more than he ever paid in dues. Supposing the total dues for membership in the national, state and local societies are $12 a year and unfortunate circumstances make the member eligible for relief payments: one year's allowance at $50 a month would pay him $600 from the A.D.A. and $600

from his state fund. This would represent dues for 100 years.

During this fiscal year, forty-seven relief grants were made, most of them monthly payments extending over a period of one year. For relief, $9,469.52 was paid out. (Not one penny is charged against this for overhead.)

The sum of $57,566.44 has been distributed to worthy needy dentists since the commission was organized in 1925. Thirty-five states were represented in this distribution.

COMMITTEE ON PROCESS PATENT

The Committee on Process Patent is a standing committee organized seven years ago. It is composed of five members. The General Secretary of the American Dental Association is a member, with voting power, and is the secretary of the committee.

Its duties are to protect the membership from process patents which may interfere with the practice of dentistry. This may well be considered a form of insurance against an evil that has definitely existed in the past, such as license fees for the right to use vulcanite rubber for dentures.

COMMITTEE ON ECONOMICS

The Committee on Economics, which consists of fourteen members, was the first to organize under the plan whereby each A.D.A. District would be officially represented on the committee, and each state would have a deputy member under the direction of the member representing the District in which the state is located. This is the third year of operation of this plan and it is working out quite successfully.

During the year, the committee was in close contact with general and dental economic conditions throughout the country, and, with few exceptions, reports indicated a quite general improvement in economic conditions and less activity among the advocates of sickness insurance.

The provisions of the Federal Social Security Act have received much attention by the committee. Soon many states will have enacted statutes which will enable them to comply with the requirements of these laws. All dental societies must take an interest in this, especially those provisions under maternity and child welfare. The committee supplied much material to schools and colleges to aid the negative side in debates promoted by the National University Extension Association. The question debated was "Resolved that the several states should enact legislation providing for a system of complete medical service available to all citizens at public expense." The negative was successful in the majority of these debates.

Each month, this committee has issued "news releases" containing about eighteen pages of material, which has frequently been used in local and state bulletins. Also, it maintains a section on economics in THE JOURNAL.

The appropriation was $2,000, nearly half for the Secretary's services in the Central Office.

A number of plans to provide dental and medical care for the low income group have been investigated and reports compiled.

The committee aided in the Federal Emergency Relief Administration's handling of emergency dental relief. Efforts are being continued to have dental advisors appointed in the various federal health organizations.

A survey was made of the laws governing the practice of dentistry in foreign countries and a study of health insurance in foreign countries. It is attempting a census of practicing dentists in the United States and a survey of the income of den-

tists. These surveys will take considerably more time, as funds are limited. A special committee is now working on a uniform system for determining the costs of conducting a dental practice.

The committee proposed requirements for state dental health directors, assistants and others, and making a survey of dental clinics in the United States and of dental educational programs in the United States.

It aided in demonstrating the necessity for dental care for CCC enrollees and insisted on this being supplied. Authorization through Mr. Fecheur's office and the U. S. Army was issued in December, 1936. One hundred sixty-eight dental officers are to be assigned under favorable circumstances to this duty.

The committee aided in making federal contacts with several departments of government in Washington: child welfare, under Miss Katharine Lenroot, WPA, and Mr. Harry Hopkins, FERA.

The committee was unsuccessful in a rather strenuous effort to have a dentist appointed in an advisory capacity to the Federal Social Security Board.

It interested the national officials of the Boy Scouts of America in dental examinations for applicants for membership in their organization. For the first time, a dentist was appointed on the National Committee of Health and Safety, B. S. A.

THE RESEARCH COMMISSION

The Research Commission is a standing committee of twenty-five members, nominated by the Board of Trustees and elected by the House of Delegates for five-year terms.

The President, President Elect and the General Secretary are ex-officio members of this commission.

Its duties shall be to raise funds for carrying on research, to disseminate knowledge, to support, establish and encourage research and perform other duties pertaining thereto. (By-Laws, Chap. X.)

The Research Commission was allotted $13,000. In addition to this, the National Society of Denture Prosthetists contributed $500 and the American Full Denture Society $250, making a total income for the year of only $13,750 for dental research under the supervision of the American Dental Association.

The sum of $10,488 was used for work in the U. S. Bureau of Standards. We are paying for a fellowship, which began in 1928. This is in full cooperation with the U. S. Government. The commission believes this to be one of the most productive investments of the Association.

During this fiscal year, the Federal Government appropriated $4,500 in cash and the use of office and laboratory space and its scientific instruments. It assigned Wilmer Souder, physicist, and I. C. Schoonover, chemist, to research work on dental materials. The staff of the bureau participates in consultations.

The Research Commission employs three full-time research associates in the U. S. Bureau of Standards: a dentist, a physicist and a mechanical engineer, who are subject to its rules and regulations.

The major work this year has been on silicate cements and denture-base materials. The first project is about completed; the work on denture bases is still in progress.

Today, we can readily obtain from the American Dental Association lists of the following materials which have been tested and found to comply with the requirements fixed by the Bureau and adopted by the Research Commission: amalgam alloys, inlay casting investments, impression compounds, inlay casting waxes, inlay casting golds, dental mercury, wrought gold wire, alloys and zinc phosphate cements.

The University of Louisville was given $750 to assist Theodore B. Beust in his studies of dental tissues and caries.

The New York Institute of Clinical Oral Pathology, Inc., was granted $750 to assist in a study of dental pathologic conditions.

The College of Physicians and Surgeons of San Francisco was granted $250 for the partial support of a study of procaine and borocaine. The project is called "Research on local anesthesia." The results so far obtained were reported during the San Francisco meeting.

GORGAS MEMORIAL COMMITTEE

The Association has membership in the Gorgas Memorial Institute of Tropical and Preventive Medicine, which is made up of about forty persons, prominent in medicine, research, finance and politics.

The Gorgas Memorial Laboratory in Panama is in its eighth year of successful operation. In addition to the regular scientific staff, there are a sanitary engineer from the U. S. Public Health Service, a lieutenant colonel from the Army Veterinary Corps, and a lieutenant commander and two technicians from the U. S. Navy at work in this laboratory. The study of tropical and preventive medicine is the chief function of the institute.

Dentistry is represented by W. H. G. Logan, who is the secretary of the Institute, and Donald M. Gallie, who is a member of the board of directors and chairman of the American Dental Association committee.

AMERICAN DENTAL FOUNDATION, INC.

The American Dental Foundation, Inc., is an incorporation within the American Dental Association set up to receive and administer bequests and contributions as the donor may direct.

The organization plan sought to create a foundation that would not be subject to the political influences that sometimes affect associations like ours, often interfering with bequests being made by those who desire to show their gratitude to fellow members of a loved profession after death as they did when they could appear on programs and give their aid in person.

All who would like to leave funds to be used in the interests of their profession, whether it be for relief, research, education or other purposes, may feel secure in doing so, by including in their wills a short paragraph stating that a specified sum is to be paid to the American Dental Foundation, Inc., to be used for purposes specified.

It is recommended that bequests be made in such manner that the funds will be used up within a twenty-five year period.

C. N. Johnson is the head of the foundation.

F. D. I. COMMITTEE

The Fédération Dentaire Internationale, which was organized at Paris in 1900 at the termination of the Third International Dental Congress, is a permanent international dental association in which there is an affiliation of national dental societies representing all the important nations of the world.

The federation is governed by an executive council composed of the representatives of the national committees of the affiliated national dental organizations. The American Dental Association is represented in the executive council of the Fédération Dentaire Internationale by five members, constituting what is known as the F. D. I. Committee of the A.D.A., their terms of office being for five years.

Among the more important objectives of the federation are the following:

To maintain and strengthen the ties

that bind the national societies to each other.

To accept or reject invitations made by various countries to hold every five years a regular international dental congress, and to fix the date and place where such a congress shall be held.

To create and to organize international commissions whose members shall form part of the F. D. I.

To take advantage of all opportunities to promote the organization of bodies that contribute to the advancement of dental science.

To award the Miller Prize and other international prizes once every five years to those considered eminently entitled to such distinction.

To maintain the International Documentary Center of the F. D. I. as a permanent organization under the direction of the Council of Administration composed of the Bureau of the F. D. I., one or more delegates appointed by the executive council and one member from each regional center of the F. D. I.

The International Documentary Center of the F. D. I. is housed in the new Eastman clinic at Brussels, Belgium, which was made possible through the munificence of the late George Eastman.

No appropriations were made for the work of this committee.

THE COMMITTEE ON INSURANCE

The Committee on Insurance, consisting of five members, has supervision over all insurance activities of the American Dental Association. It analyzes the standing of different insurance companies, and, when called on by the Board of Trustees, submits data relative to these companies. It formulates systems of accounting and makes complete reports on insurance matter to the board, covering receipts, disbursements and other financial operations which have been carried on by those officers or committees having charge of the collection of premiums. Reports are to be printed each year in THE JOURNAL.

The committee reported that it has endeavored to find a contract providing for a policy for A.D.A. members which will obviate the now existing decreasing principle sum objection, to our present contract.

The committee finds the company now carrying our risks financially responsible and willing to comply promptly with the terms of its contract.

There were 6,234 policies in force last July.

GENERAL COMMENTS

The income for the year exceeded expenses by $37,448.75. This is good business management. While it seems a large sum of money, it amounts to a reserve of only about one dollar per member, which can be very quickly dissipated by a fluctuation in prices, or some unforeseen emergency.

The purchase of the Superior Street property has proved a good investment owing to accretion in values in this district and affords a big saving over the former cost of office space in the Garland Building.

The American Dental Association is a component of the American Association for the Advancement of Science.

The answer to the question used for the title of this paper is obvious. It would be very difficult to arrive at a fair estimate of the tangible and intangible annual value of organized dentistry to each individual practitioner in the profession. Consequently, it was necessary to try to tell what each group is trying to do.

A careful review will convince all conscientious persons that it is definitely their duty to assume the responsibilities of membership in this great organization.

COUNCIL ON DENTAL THERAPEUTICS

ACCEPTED DENTAL REMEDIES

COD LIVER OIL AND RELATED SUBSTANCES*

The following articles have been accepted as conforming to the rules of the Council on Dental Therapeutics of the American Dental Association. The Council wishes dentists to understand that the admission of an article does not imply a recommendation. A copy of the rules that govern the Council in the consideration of articles will be sent on request.

SAMUEL M. GORDON, *Secretary.*

Percomorph Liver Oil.—Oleum Percomorphum.—A mixture containing the fixed oils obtained from the fresh livers of the percomorph fishes, principally Xiphias gladius, Pneumatophorus diego, Thunnus thynnus and Stereolepis gigas, and sometimes also Neothunnus macropterus, Katsuwonus pelamis, Sarda chiliensis, Germo alalunga, Thunnus orientalis, Scomber scombrus, Seriola dorsalis, Lutianus campechanus, Epinephelus morio, Roccus lineatus, Cynoscion nobilis, Eriscion macdonaldi, Epinephelus analogus, Stereolepis ishinagi and Sphyraena argentea, containing 50 per cent of cod liver oil. It is biologically assayed to have a potency of not less than 60,000 units of vitamin A (U.S.P.) per gram and of not less than 8,500 units of vitamin D (U.S.P.) per gram.

ACTIONS AND USES: These are the same as those of cod liver oil. (See general article "Cod Liver Oil and Related Substances," A.D.R., 1935, p. 83.)

DOSAGE: Prophylactic doses, for normal infants, are 10 drops daily; curative, and in severe conditions, to 20 drops daily. The product is marketed with a dropper designed to deliver 3 drops to the minim. (These doses are for protection against rickets. See A.D.R., 1935, p. 83, concerning dosages as applied to teeth.)

Percomorph liver oil, 50%, in cod liver oil, is a yellow to brownish yellow, oily liquid. It has a slightly fishy, but not rancid odor and a fishy taste. It is slightly soluble in alcohol but is soluble in ether, chloroform, benzene, carbon disulfide and ethyl acetate. The specific gravity is from 0.922 to 0.930 at 25 C. The refractive index is from 1.480 to 1.485 at 20 C.

Further tests of identity and purity appear. (J.A.M.A., 107:1891, [Dec. 5] 1936.)

Mead's Oleum Percomorphum.—A brand of percomorph liver oil.

Manufactured by Mead Johnson & Co., Evansville, Ind. No U. S. patent or trademark.

Mead's Oleum Percomorphum, 50 % (in Capsules).—Each capsule contains 10 drops (0.222 gm.) of Mead's Oleum Percomorphum, 50 per cent, representing a vitamin potency of not less than 13,300 vitamin A units and 1,850 vitamin D units (U.S.P.).

Mead's Cod Liver Oil Fortified with Percomorph Liver Oil.—A mixture of cod liver oil-U.S.P. and percomorph liver oil 5 per cent. It has a potency of not less than 6,000 vitamin A units (U.S.P.) per gram and of not less than 850 vitamin D units (U.S.P.) per gram.

*Accepted Dental Remedies, 1935, p. 82.

EVIPAL SOLUBLE

In 1931, the Council, in discussing intravenous medication, remarked:

In view of the inherent dangers of intravenous injection, the Council cannot condone this type of medication for dental practice except in very special or emergency cases when other methods are contraindicated or have failed. (Report of the Council, J.A.D.A., 18:1787, September 1931.)

The Council particularly emphasized the then recent attempts to obtain basal anesthesia for dental operations with soluble barbiturates. More recently, Evipal Soluble (introduced as Evipan Sodium) has been the subject of several reports in the dental literature. (A partial dental bibliography appears at the end of this report.)

As far as the Council is aware, no marked attempt to promote the product among the dental profession has been noted. Because of the interest in this form of anesthesia, the product has been under observation by the Council for several years. Recently, the Council on Pharmacy and Chemistry of the American Medical Association issued a report on its consideration of this product. Since the methods of administration and the dosages considered by the Council on Pharmacy and Chemistry appear to be similar to those advocated by dental authors, and since the contraindications recognized by the medical Council are not materially different from those that would be recognized by this Council, their report is republished as a report of this Council. In republishing this report, the Council on Dental Therapeutics desires to reaffirm the conclusions of the Council on Pharmacy and Chemistry and to tender its thanks for permission to republish this report.

SAMUEL M. GORDON, *Secretary.*

The Winthrop Chemical Company, Inc., has been very active in promoting Evipal Soluble in the United States. It has not, however, presented the product to the Council on Pharmacy and Chemistry. The Council was therefore obliged to take up the consideration on its own initiative.

Evipan (Cyclural), C-C-Cyclohexenyl-N-methyl-barbituric acid, was prepared in the Elberfeld Chemical Laboratory, and in 1932 it was introduced under the name Endorm as a hypnotic having a brief action. Evipan is slightly soluble in water, but the readily soluble salt, Evipan Sodium, was introduced as a general anesthetic to be injected intravenously. The product is still known abroad by the term Evipan, or Evipan Soluble (for the sodium salt). In the United States, Evipal Soluble (Cyclural Soluble) is the market name. Both names (Evipan Sodium and Evipal Soluble) are used in this report, because both are used in the literature; in general, the name Evipal Soluble is used for the product sold in this country and Evipan Sodium for that sold abroad. The ending "al" makes the product consistent with the terminology accepted for most of the hypnotics of the barbituric acid series.

I. PHARMACOLOGY

It would seem almost trite to state that there can be no rational therapeutic use of an agent without adequate knowledge of its pharmacologic actions, but the following discussion of available literature shows that Evipan Sodium was introduced into general use before adequate pharmacologic investigations had been made.

Weese,[1] the director of the pharmacologic laboratories of the I. G. Farbenindustrie A. G. Elberfeld, determined the hypnotic, narcotic and fatal doses of Evipan Sodium, for the cat and mouse by oral administration, for the mouse by subcutaneous injection, and

1. Weese, H.: Deutsche med. Wchnschr., 58:1205, 1932.

for the cat and dog by intravenous injection. He reported that the intravenous narcotic dose for the cat is 25 mg. per kilogram and that the fatal dose is from 100 to 110 mg. per kilogram; that the therapeutic ratio for the cat is 4, while that for the dog is 3.3. He stated that it lacks local irritant actions and side actions as well as after-effects; that the slight affinity for the vital organs explains the slight toxicity and broad therapeutic margin.

Weese[2] explained later that the action of Evipan Sodium is brief after its intravenous injection because it is destroyed rapidly in the liver, little being excreted in the urine. The narcotic action is prolonged when the function of the liver is impaired. Weese stated that a fatal dose always causes death in the cat by paralysis of respiration. This has been interpreted to apply to man, in which case it is dangerously misleading.

Weese[2] described six stages of narcosis. That stage which is always induced by the intravenous injection of 25 mg. per kilogram in the cat is termed "rausch." In this stage there is confusion without abolition of the reflexes, but full anesthesia with loss of the reflexes was not always induced with doses of less than 30 mg. per kilogram. This shows, of course, a lower therapeutic ratio than 4, but the latter fact has been ignored by many who have cited Weese's therapeutic ratio, even when they used full anesthetic doses, with loss of reflexes.

Parsons[3] "found that in the cat 0.1 c.cm. of a 10 per cent solution caused a fall in B. P. of 25 mm. Hg, with slow recovery and apnoea for 20 seconds. After a total of 0.6 c.cm. of 10 per cent solution [60 milligrams] artificial respiration was needed and the B. P. fell until death." The rate of the injection is not stated, but these figures suggest a factor of safety, or therapeutic ratio of 2 for full anesthesia [Weese's sixth stage]; they are also in harmony with the results of experiments on guinea-pigs reported by Kennedy, but they are not in harmony with the statement of Weese.

Kennedy[4] reported a therapeutic index of 4 for mice. There was great variation in the fatal dose, and the therapeutic ratio based on the smallest fatal dose is about 3. Kennedy found guinea-pigs more susceptible than mice, but he does not state the therapeutic factor for these. A dose of 0.4 mg. per 10 Gm. of weight did not produce unconsciousness, and none survived a dose of 1 mg.; hence the indicated therapeutic ratio is evidently less than 2.5. There is no justification for assuming that the therapeutic ratio for man is less than that for the guinea-pig, but these figures have been ignored almost completely by those who used Evipan Sodium for narcosis.

Kennedy observed that sneezing preceded narcosis in mice and that opisthotonos occurred in 25 per cent of the animals before complete muscular relaxation was induced. Many exhibited a fine tremor or violent shaking of the whole body, which was lessened by warming. Death resulted from failure of respiration. Two mice were anesthetized seventeen and eighteen times, respectively, with intervals of one or two days; some liver damage resulted. Kennedy found that toxic properties predominated when frogs were used.

Kennedy and Narayana[5] found that the frog's heart brought to a standstill by perfusion with solution of Evipan Sodium recovered when perfused with unpoisoned solution. This is in harmony with the results observed by Storm,[6] who perfused the heart of the monkey. He observed that the slow intravenous injection of 25 mg. per kilogram induced narcosis without excitement in the monkey (Hylobates and Macaca irus), with abolition

2. Weese, H.: Deutsche med. Wchnschr., 59:47, 1933.

3. Parsons, cited in report of Anesthetics Committee Medical Research Council, Lancet, 2:43 (July 1) 1933.

4. Kennedy, W. P.: J. Pharmacol. & Exper. Therap., 50:347, 1934.

5. Kennedy, W. P., and Narayana, B.: Quart. J. Exper. Phys., 24:69, 1934.

6. Storm, C. J.: Klin. Wchnschr., 14:504, 1935.

of spinal reflexes. Any slight fall of blood pressure resulted from action on the vasomotor centers. Fatal doses caused death by paralysis of respiration before the heart stopped.

Wright[7] stated that a dose of ¼ grain of Evipan Sodium per pound [35.6 mg. per kilogram] caused anesthesia lasting from ten to fifteen minutes in the dog, followed by a narcotic period [attended with incoordination] lasting from three to four hours. He states: "In every case in which it has been used, this period of recovery has been associated with frenzied struggling and excitement, and for this reason we have ceased to use it." Wright is a veterinarian and refers to its use for animals.

Holck and Cannon[8] reported that delayed death in rats followed apparent recovery from depression induced by Nostal, but not that due to Evipan Sodium or any one of several other barbiturates.

Dallemagne[9] reported that Evipan Sodium caused serious anemia in dogs, even when the dose was repeated at intervals of several weeks. Clinical reports of the use of repeated doses of the drug do not contain any mention of anemia, even when the dose was repeated twenty-nine times.[10]

Schranz[11] observed that patients with peritonitis and septic conditions required smaller doses of Evipan Sodium for anesthesia than did the average patient. He found that with the progress of infection and increasing weakness in experimentally infected animals the narcotic dose fell to one-fifth that required for healthy animals. Velu[12] reported that the injection of a dose of 33 mg. of Evipan Sodium per kilogram caused marked cyanosis in a horse which was severely ill with trypanosomiasis.

Von Brandis[13] found that with increasing depth of narcosis induced by Evipan Sodium or other anesthetic the analeptic effects of epinephrine, caffeine, strychnine, cardiazol, (metrazol), coramine and strophanthin diminish and finally cease and that in deep narcosis these analeptics injure the circulation and respiration in the rabbit. He states that these results cannot be transferred directly to man. If it is valid to transfer the therapeutic ratio to man, it is difficult to explain why the results observed by von Brandis should not be equally applicable to man.

Fretwurst[14] administered a total of 15 Gm. of Evipan orally to a dog in a period of ten days and recovered 5.6 per cent of the total barbituric acid in the urine, but he did not determine the form in which it was present. He stated that he and Halberkann had found from 1.2 to 4.5 per cent of single intravenous doses in the urine in man.

II. THE THERAPEUTIC USE OF EVIPAN AS A HYPNOTIC

The therapeutic use of Evipan as a hypnotic is of minor importance in the present discussion; hence it will be discussed briefly. Scharpff[15] observed that it induces sleep promptly, and, since its action is brief, he concluded that it is useful for inducing sleep in those who lie awake without pain and for those who waken early in the morning. He observed no ill effects from its use, with reference to the heart or vascular system, and no effects on the day following its administration. Weese[1] reported that the hypnotic and narcotic doses in animals lie close together, but it is obvious that the hypnotic dose for

7. Wright, J. G.: Proc. Roy. Soc. Med., 29:701 (sectional page 45), 1936.
8. Holck, H. G. O., and Cannon, P. R.: J. Pharmacol. & Exper. Therap., 57:128, 1936.
9. Dallemagne, M. J.: Anesth. & Analg., March-April, 1936, p. 82.
10. Bartlakowski, J.: Zentralbl. f. Chir., 61:2721, 1934.
11. Schranz: Arch. f. klin. Chir., 177:53, 1933.
12. Velu, cited by Menegaux and Sechehaye.
13. Von Brandis: Arch. f. klin. Chir., 177:17, 1933.
14. Fretwurst: M. Klin., 29:893, 1933.
15. Scharpff, W.: Deutsche med. Wchnschr., 58:1205, 1932.

man when used in this way is far from the full anesthetic dose. Unfortunately the term "hypnotic" is also used to indicate the condition of mental confusion bordering on anesthesia in man. The hypnotic dose in that sense also lies near the narcotic, in fact it is the narcotic, in man.

III. NARCOSIS

The terms basal, basis and induction narcosis and "rausch" are used by different individuals with slightly different meanings, and several have defined these terms. Harms[16] defines "rausch" as the stage between sleep and full narcosis, during which perception of pain is lost but during which the patient is able to answer questions intelligently. It is useful for slight operations, such as simple incisions, and for the removal of teeth. Evipan Soluble has been recommended by many for inducing various stages of anesthesia, and Kamniker and Rintelen[17] stated that it had been generally accepted for "rausch" by those at the German Surgical Congress in 1933.

Baetzner[18] reported that he had used Evipan Sodium in about 400 cases; that his investigation was incomplete, but that he had found it useful for "rausch," preliminary to ether or ethyl chloride, and alone for full anesthesia; that it is harmless and safe, with a complete absence of contraindications; that no special technic or experience regarding dosage is required—one merely follows the rules; that this requires no skill for its administration.

Holtermann[19] used the drug in about 700 obstetric and gynecologic cases and was warm in his praises, recommending it for all short gynecologic operations, but not before delivery in labor, because of want of knowledge of its action on the child. Later Holtermann[20] became more conservative after he had used it about 1,800 times, during which he had a fatality. He then maintained that it could not be used with entire safety for full anesthesia.

Kobel[21] stated that it is increasingly plain that Evipan Sodium is not suitable for long operations. Unfortunately, the conservative view which Kobel expressed so early in the history of the drug was not generally accepted at that time, and Kohlhage[22] maintained that it is useful in suitable cases for prolonged operations. He opposed its use in obstetrics because of interference with uterine contractions. The difficulty lies in determining which cases are suitable. There is even today a want of agreement, and Coryllos and Bass[23] recommended its use in major operations. Oettle[24] probably expresses the opinion of the greater number of conservative observers when he holds that the drug finds its proper field limited to induction and short narcosis.

IV. DOSAGE

Evipal Soluble is sold in ampules each of which contains 1 Gm. of the drug, with an ampule which contains 10 cc. of sterile water. The aqueous solution decomposes in a short time; hence the drug is dissolved in the sterile water just before it is used. It is stated in the advertising and by many authors that this forms a 10 per cent solution and

16. Harms, J.: Ztschr. f. Chir., 241:741, 1933.
17. Kamniker, K., and Rintelen, G.: Ztschr. f. Chir., 244:571, 1935.
18. Baetzner, W.: Deutsche med. Wchnschr., 59:48, 1933.
19. Holtermann, C.: Deutsche med. Wchnschr., 59:50, 1933.
20. Holtermann, C.: München. med. Wchnschr., 80:1547, 1933.
21. Kobel, E.: Deutsche med. Wchnschr., 59:996, 1933.
22. Kohlhage, T.: München. med. Wchnschr., 81:110, 1934.
23. Coryllos, P. N., and Bass, Sara: Current Researches in Anesth. & Analg., 15:66, 1936; Ann. Surg., 104:46 (July) 1936.
24. Oettle, E.: Zentralbl. f. Chir., 63:1104, 1936.

that 1 cc. contains 0.1 Gm. of the drug. The solution prepared according to the printed directions measures slightly more than 10 cc., and 1 cc. contains less than 0.1 Gm. The error is usually negligible, but it should not occur with such a potent drug. The solution made in this way is so generally used that the dosage is almost always expressed in cubic centimeters of this solution, and reference is made to it in the present discussion. Many authors stated in 1933 that they used the doses recommended by the manufacturers. The referee has not seen the earliest advertising by Evipan Sodium, but it is often implied that 10 cc. is the dose recommended. A circular received by a physician in 1935 bears the following statement:

"Simple Dosage Determination

"Estimation of the required dosage is not difficult. It is based essentially on the rapidity and intensity of the effect of the first fraction of the dose on the individual patient. As with other anesthetics, the general condition is also taken into consideration. Furthermore, the maximum of 0.06 cc. of the 10 per cent solution of Evipal Soluble for every pound of body weight is usually not exceeded at a single injection. The adult dose, therefore, ranges from 5 to 10 cc."

The circular contains no instructions regarding the rate of injection, nor does it mention any contraindications specifically. The foregoing statement is in harmony with that of Baetzner, who maintained that one "merely follows the rules," and also with that of Baumecker,[25] who stated that initial doses vary from 4 to 5 cc. in about one minute, the remainder more rapidly, the "exact dosage not being given and not necessary." He referred to the dosage recommended by the manufacturers and stated that they recommended a maximum of 10 cc. of the 10 per cent solution. Samuel[26] stated that with doses of from 4 to 5 cc. and repetitions of from 2 to 3 cc. one may secure painless childbirth.

Numerous reports of serious accidents and some fatalities following the use of Evipan Sodium soon led to efforts to devise a safe and effective method of administration. This involves two closely related questions. The first is the total dosage; the second is that of the rate of injection.

Baetzner[27] stated that it is wrong to follow any schematic dosage; that the hypnotic [light narcotic] dose for some patients is only from 0.5 to 1.0 cc., and that in one case a total of 1.5 cc. sufficed for anesthesia for an operation for hernia in a man of 75; that the elderly and the decrepit seldom require more than 4 cc., and that the use of even that dose often requires extreme care. Simenauer[28] reported tolerance [light anesthesia] induced by 0.5 cc. in a man in whom there was closure of the bile duct. Lauber[29] reported that sleep followed the injection of only 1 cc. in a man weighing 85 Kg. in whom a total of 3 cc. sufficed for anesthesia during an amputation. Honkamp[30] reported that some elderly patients bore doses of 10 cc. well, while some did not. Baetzner[31] reviewed the subject and stated that much less is needed than was at first supposed; that the chief field is for induction and for short operations. The tone of this paper is in sharp contrast to that of his first.

It was maintained for a time that the drug must be injected fairly rapidly—the total within from two to three minutes—in order to secure a sufficiently high concentration in the blood stream. Anschuetz[32] stated that excitation in the first stage was due to over-

25. Baumecker, H.: Zentralbl. f. Chir., 60:482, 1933.
26. Samuel, M.: Deutsche med. Wchnschr., 59:286, 1933.
27. Baetzner, W.: Zentralbl. f. Chir., 61:597, 1934.
28. Simenauer, quoted by Stimpfl.
29. Lauber, J.: Zentralbl. f. Chir., 60:806, 1933.
30. Honkamp: Med. Klin., 29:1085, 1933.
31. Baetzner, W.: Zentralbl. f. Chir., 62:1600, 1935.
32. Anschuetz, W.: Zentralbl. f. Chir., 60:1361, 1933.

dosage or to a too slow rate of injection. Laesecke[33] held that injection at a slower rate than 1 cc. in fifteen seconds tends to induce resistance and failure to induce anesthesia.

Smaller doses and a slower rate of injection soon came into use among conservative surgeons, and Gautier[34] stated that slow injection is the main consideration and that rapid injection leads to inevitable disaster. He injected pantopon (the hydrochlorides of the alkaloids of opium, principally morphine) and after an hour the solution of Evipan Sodium was injected at the rate of 1 cc. in two minutes. When prolonged anesthesia was desired, Gautier injected from 0.5 to 1.0 cc. every five to ten minutes. There is still some diversity of opinion concerning the optimum rate of injection, but many conservative surgeons inject the solution slowly until twilight sleep is induced, and after an interval of about three minutes, during which the depth of anesthesia increases, additional amounts are injected slowly until the required stage of anesthesia is induced. Prolonged anesthesia is maintained preferably with ether. Some maintain that with the injection of fractional doses of 1 cc. or less the control of anesthesia is equal to that with ether.

The widely different views of equally competent observers may be harmonized in part with the knowledge gained by experience. Rapid injection is not desirable, but it is far less dangerous in young, healthy, strong patients than in elderly, feeble and seriously ill patients, who are peculiarly susceptible to the toxic effects of the drug. Rapid injection is courting disaster with such patients. The questions of dosage and the rate of injections are closely connected with those of indications and contraindications, and they cannot be considered wholly independently.

The functional activity of the liver in any patient influences the safety of a given dose of Evipal Soluble, but the anesthetic activity and the toxicity are increased by a great variety of conditions, which must be considered when determining the availability of the anesthetic and in calculating the dosage. Healthy children and strong, healthy, young adults require relatively large doses, and "failures" are more common among such patients than among the elderly. Severe sepsis, ileus, peritonitis, cachexia, emaciation, severe hemorrhage, and anything that tends to lower the resistance of the circulatory and respiratory systems are all indications for the greatest caution with regard to the total dose and to the rate of injection. It is not difficult, therefore, to understand why some patients have been poisoned severely by as little as 2 cc. of the solution, while others have borne total amounts of 50 cc. during prolonged anesthesia, with no obvious injury.

Many use morphine as a routine before general anesthesia without recording the fact, and it is often impossible to know whether it was used in a given case. One is often practically certain that morphine was used in cases in which the effects following the use of very small doses of Evipal Soluble in nearly normal patients greatly exceed those which are to be expected from such doses of the anesthetic alone. Geiger[35] reported that he injected 1 cc. of morphine [sic] followed by 25 cc. of Evipan Sodium during an operation lasting three hours on a man of 70 years with excellent results. That suggests either extraordinary good fortune or an extraordinary patient.

The manufacturer does not recommend the use of morphine, but its use permits the utilization of smaller doses of the anesthetic with smoother anesthesia and fewer "failures." The smaller doses of the anesthetic are attended with less frequent tremor and convulsive movements, which often interfere with operation. It is well known that Evipal Soluble and morphine are both depressants of the respiratory center, and there can hardly be a serious question that toxic doses act synergistically to depress the respiration. With wisely selected therapeutic doses of each, the synergistic action on the respiration is often less than that of the total dose of Evipal Soluble which would be required alone to induce the same degree of anesthesia. The Council's referee believes that small doses of

33. Laesecke, M.: Zentralbl. f. Chir., 60:1042, 1933.
34. Gautier, J.: Bull. et mém. Soc. nat. d. chir., 60:1140, 1934.
35. Geiger: Zentralbl. f. Chir., 62:2243, 1935.

morphine—seldom more than 10 mg.—are often desirable; but there is no justification for using larger doses of morphine in the form of omnopon or pantopon than would be used in the form of the official morphine sulfate.

One may say that the dose of Evipal Soluble solution varies from 0.5 to 10 cc. for short operations or for induction anesthesia, dependent on many conditions, not all of which can be known in advance. The Council's referee does not believe that larger doses or repetitions of fractional doses should be used for prolonged anesthesia. Stohr[36] stated that he had discussed the question of dosage with many surgeons and that it becomes increasingly evident that there is hardly another drug which requires such individualization for safety.

V. ANTIDOTES

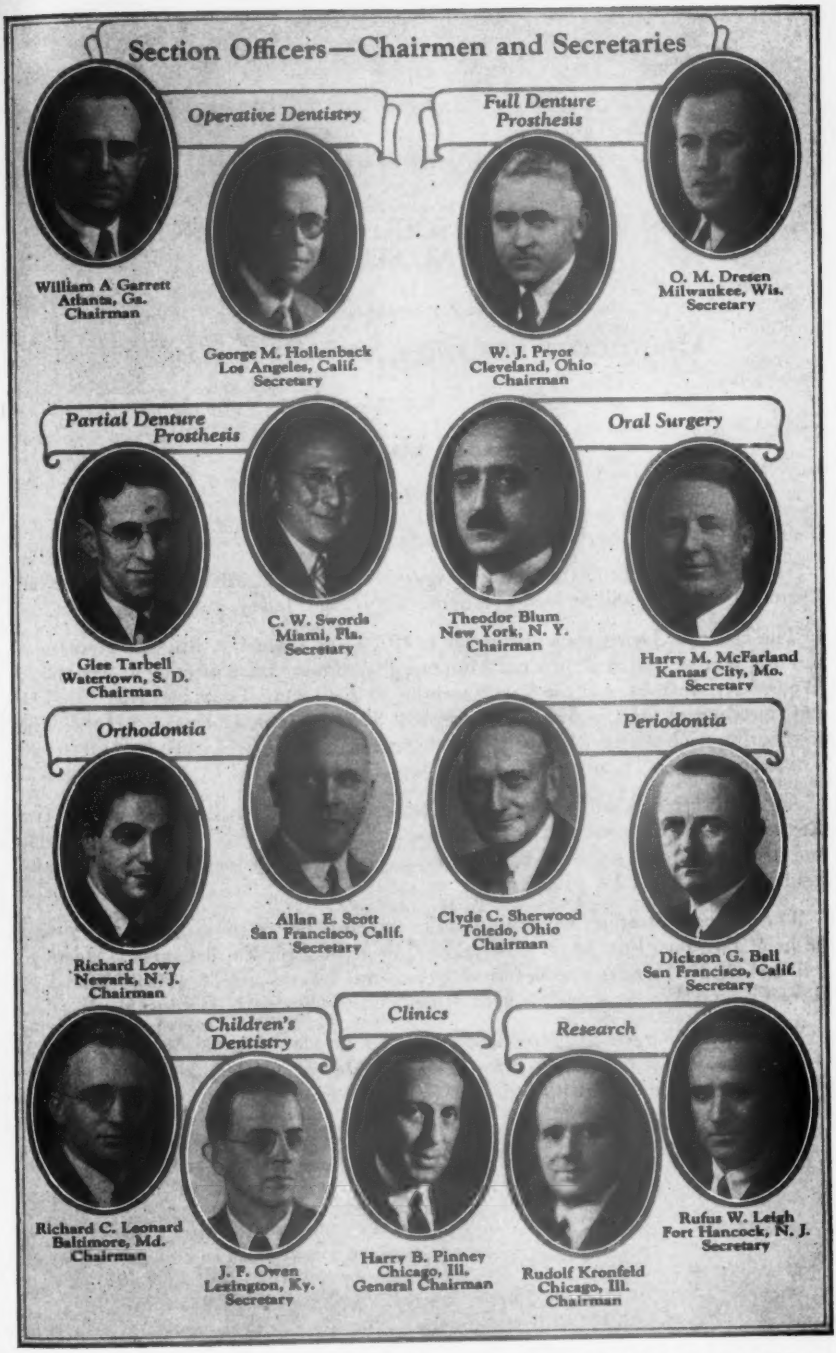
Evipal Soluble has the actions of other barbiturates, differing mainly in its rapid decomposition in the liver. Any substance which counteracts the effects of other barbiturates and which acts promptly and without harm to the patient may be useful in treating poisoning with Evipal Soluble; but severe or fatal accidents sometimes follow the injection with such suddenness that little can be done to counteract the toxic effects. One is impressed with the frequency with which observers have reported that they had used lobeline, caffeine, strychnine, coramine, metrazol (cardiazol), epinephrine or oxygen with carbon dioxide and artificial respiration without success. Recent work suggests that picrotoxin may be valuable when we have accurate knowledge of the proper technic for its use under a variety of conditions. It is a very active agent, and capable of causing death when excessive doses are used.

The observation of von Brandis [13] that with increasing depth of anesthesia the analeptic action of several of the drugs commonly employed as antidotes to the barbiturates lessens and may even increase the depression in normal animals in deep narcosis helps to explain why these often failed to restore patients who had suffered collapse after the injection of Evipal Soluble.

Lundy [37] states that the safe intravenous injection of Evipal Soluble or other barbiturates induces anesthesia so slowly that surgeons complain of the delay; he suggested the addition of 25 mg. of the cardiac and respiratory stimulant pyridine betacarbonic acid diethylamide to every cubic centimeter of the solution of the barbiturate. This procedure does not impress the referee favorably. Should severe respiratory depression result from overdosage with this method, it would seem to leave no satisfactory resource available.

(To be continued.)

36. Stohr, R.: Wien. klin. Wchnschr., **48**:1618, 1935.
37. Lundy, J. S.: Proc. Staff Meet., Mayo Clin., **10**:791, 1935.



CHAIRMEN AND SECRETARIES OF THE SCIENTIFIC SECTIONS OF THE AMERICAN DENTAL ASSOCIATION, 1937

AMERICAN DENTAL ASSOCIATION SEVENTY-NINTH ANNUAL SESSION

ATLANTIC CITY, NEW JERSEY, JULY 12, 13, 14, 15, 16, 1937

OFFICIAL CALL

To the Members of the American Dental Association:

You are hereby notified that the Seventy-Ninth Annual Session of the American Dental Association will be held in Atlantic City, New Jersey, July 12-16, 1937.

The House of Delegates will convene at 10:00 a.m., Monday, July 12. The second meeting will be held at 2:30 p.m., Monday, July 12; the third meeting at 2:30 p.m., Wednesday, July 14, and the fourth meeting at 2:30 p.m., Thursday, July 15. The four meetings of the House of Delegates will be held in the Ambassador Hotel. The Credentials Committee will register Delegates and Alternates, beginning at 10:00 a.m., Sunday, July 11, at the Ambassador Hotel.

All other members will register at the Registration Office, in the Auditorium. The Registration Department will be open from 9:00 a.m. to 5:00 p.m., Sunday, July 11, and from 8:30 a.m. to 5:00 p.m. Monday, Tuesday, Wednesday, Thursday and Friday, July 12, 13, 14, 15 and 16.

The General Meeting, which constitutes the opening exercises of the Session, will be held Tuesday, July 13, at 9:30 a.m. The second and third General Meetings will be held on Tuesday and Wednesday evenings, July 13 and 14, at 8:30 p.m. The three General Meetings will be held in the Convention Hall, Auditorium.

The constituent societies are hereby notified to file with the Secretary of this Association at least thirty days prior to the first day of the Annual Session a list of the names and addresses of their Delegates and Alternates.

LEROY M. S. MINER, *President,*
HARRY B. PINNEY, *Secretary.*

GENERAL PROGRAM

Registration (General) ..... Sunday, July 11, 9:00 a.m.
(Auditorium)
Registration (Delegates and Alternates) ..... Sunday, July 11, 10:00 a.m.
(Ambassador Hotel)
Board of Trustees (First Meeting) ..... Friday, July 9, 10:00 a.m.
(Ambassador Hotel)
Board of Trustees (Second Meeting) ..... Saturday, July 10, 10:00 a.m.
(Ambassador Hotel)
House of Delegates (First Meeting) ..... Monday, July 12, 10:00 a.m.
(Ambassador Hotel)
House of Delegates (Second Meeting) ..... Monday, July 12, 2:30 p.m.
(Ambassador Hotel)
House of Delegates (Third Meeting) ..... Wednesday, July 14, 2:30 p.m.
(Ambassador Hotel)
House of Delegates (Fourth Meeting) ..... Thursday, July 15, 2:30 p.m.
(Ambassador Hotel)

PRELIMINARY PROGRAM FOR ATLANTIC CITY SESSION

FIRST GENERAL MEETING

(Convention Hall, Auditorium)

TUESDAY, JULY 13

9:45 a.m. Music
William H. Jackson, Organist ..... Atlantic City, N. J.

10:00 Invocation
Dr. Henry Merle Mellen ..... Atlantic City, N. J.

10:05 Greetings from the State of New Jersey
Governor Harold Hoffman ..... Trenton, N. J.

10:15 Greetings from Atlantic City
Mayor C. D. White ..... Atlantic City, N. J.

10:20 Greetings from the New Jersey State Dental Society
Harry L. Bull, President ..... Jersey City, N. J.

10:25 Greetings from the Local Arrangements Committee
John S. Owens, General Chairman ..... Camden, N. J.

10:30 Response of the American Dental Association
Walter M. Morgan ..... Nashville, Tenn.

Introduction of visitors from foreign countries

President's Address
Leroy M. S. Miner ..... Boston, Mass.

SECOND GENERAL MEETING

(Convention Hall, Auditorium)

TUESDAY, JULY 13

8:30 p.m. Music
William H. Jackson, Organist ..... Atlantic City, N. J.

8:45 Address: "Next Steps in Public Health"
Thomas Parran, Jr., Surgeon General, U. S. P. H. S. ..... Washington, D. C.

Music

9:15 Address: "Preventive Dentistry—A Fancy or a Fact?"
Walter T. McFall ..... Nashville, Tenn.

Music

9:40 Address: "Promoting Preventive Dentistry Through Visual Education"
Walter Emerson Briggs ..... Attleboro, Mass.

Music

THIRD GENERAL MEETING

(Convention Hall, Auditorium)

WEDNESDAY, JULY 14

8:30 p.m. Music
William H. Jackson, Organist ..... Atlantic City, N. J.

8:45 Address: "The Social Security Program"
Hon. Arthur J. Altmeyer, Chairman, Social Security Board .....
..... Washington, D. C.

Music

Address: "Dental Security for All People"
L. M. Waugh, U. S. Public Health Service dental consultant .....
..... New York City

Music

FOURTH GENERAL MEETING

(Westminster Hall, Hotel Chelsea)

THURSDAY, JULY 15

8:00 p.m. Dinner Dance (Formal)
In honor of retiring President, Leroy M. S. Miner.

THE SCIENTIFIC SECTIONS

TUESDAY, JULY 13

OPERATIVE DENTISTRY, MATERIA MEDICA AND THERAPEUTICS

(Auditorium—First Floor, Room A)

OFFICERS OF SECTION

William A. Garrett, Chairman..Atlanta, Ga.
W. Samuel Tucker, Vice Chairman.....New Orleans, La.
George M. Hollenback, Secretary.....Los Angeles, Calif.

2:30 to 5:00 p.m.

2:30 "Use of Ammoniacal Silver Nitrate in Disclosing and Immunizing Against Incipient Caries"
By James M. Prime .....Omaha, Nebr.

3:30 "Porcelain Inlay Indirect Method"
By E. Bruce Clark.....Uniontown, Pa.

4:30 "Full Cast Crown for Single Restoration Versus Full Cast Crown for Abutment Restorations"
By B. F. Sapienza .....Birmingham, Ala.

Discussed by
A. W. Sears .....Jacksonville, Fla.

FULL DENTURE PROSTHESIS

(Auditorium—First Floor, Room C)

OFFICERS OF SECTION

W. J. Pryor, Chairman.....Cleveland, Ohio
R. O. Schlosser, Vice Chairman..Chicago, Ill.
O. M. Dresen, Secretary....Milwaukee, Wis.

2:30 to 5:00 p.m.

2:30 "Lower Impression Making"
By Dayton Dunbar Campbell.....Kansas City, Mo.

3:15 "Observations Drawn from Thirty Years of Prosthetic Service"
By Felix A. French.....Ottawa, Canada

4:00 "Some Phases of Denture Work"
By Alexander H. Paterson.....Baltimore, Md.

PARTIAL DENTURE PROSTHESIS

(Auditorium—First Floor, Room B)

OFFICERS OF SECTION

Glee Tarbell, Chairman....Watertown, S. D.
Alver Selberg, Vice Chairman.....San Francisco, Calif.
C. W. Swords, Secretary.....Miami, Fla.

2:30 to 5:00 p.m.

2:30 "Partial Dentures That Fail; Partial Dentures That Function"
By Irving R. Hardy.....New York City

3:15 "Fundamentals Involved in Prescribing Restorative Dental Remedies"
By B. B. McCollum...Los Angeles, Calif.

4:00 "The Articulation of Human Teeth"
By Charles E. Stuart.....Ventura, Calif.

ORAL SURGERY, EXODONTIA AND ANESTHESIA

(Auditorium—Second Floor, Ballroom)

OFFICERS OF SECTION

Theodor Blum, Chairman....New York City
Aubrey L. Martin, Vice Chairman.....Seattle, Wash.
Harry M. McFarland, Secretary.....Kansas City, Mo.

2:30 to 5:00 p.m.

2:30 "Biopsy in Oral Surgery"
By Raymond Gettinger (M.D.).....New York City

3:15 "The Pulptester in Conservative Management of Oral Surgical Lesions"
By Theodore Kaletsky....New York City

4:00 "Studies in Adamantinoma"
By Lester R. Cahn.....New York City

ORTHODONTIA

(Auditorium—First Floor, Room E)

OFFICERS OF SECTION

Richard Lowy, Chairman.....Newark, N. J.
George R. Moore, Vice Chairman.....Ann Arbor, Mich.
Allen E. Scott, Secretary.San Francisco, Calif.

2:30 to 5:00 p.m.

2:30 "Construction of Lingual-Labial Appliance and Guide Plane" (Illustrated step by step in motion pictures)
By Claude R. Wood....Knoxville, Tenn.

3:15 "Problems of Diagnosis and Treatment"
By George M. Anderson..Baltimore, Md.

4:00 "Factors to Be Considered in Retention"
By Howard E. Strange.....Chicago, Ill.

PERIODONTIA

(Auditorium—First Floor, Room D)

OFFICERS OF SECTION

Clyde C. Sherwood, Chairman..Toledo, Ohio

Robert L. Dement, Vice Chairman.....
.....Atlanta, Ga.

Dickson G. Bell, Secretary.....
.....San Francisco, Calif.

2:30 to 5:00 p.m.

2:30 "Preventive Measures in Periodontia"
By James E. Aiguier...Philadelphia, Pa.

3:15 "Etiologic Factors in Periodontoclasia"
By Arthur H. Merritt....New York City

4:00 "What Is Surgery's Place in Periodontia?"
By M. H. Garvin....Winnipeg, Canada

CHILDREN'S DENTISTRY AND ORAL HYGIENE

(Auditorium—Third Floor, Room 12)

OFFICERS OF SECTION

Richard C. Leonard, Chairman.....
.....Baltimore, Md.

Walter T. McFall, Vice Chairman.....
.....Nashville, Tenn.

J. F. Owen, Secretary.....Lexington, Ky.

2:30 to 5:00 p.m.

2:30 "Histologic Evidence of the Benefit of Temporary Filling in Operative Procedures and of Successful Pulp Capping of Deciduous Teeth"
By Charles F. Bodecker..New York City
Discussed by
Anderson M. Scruggs.....Atlanta, Ga.

3:15 "The Nutrition History and Its Relation to Dental Problems"
By Nina Simmonds (Sc.D.).....
.....San Francisco, Calif.
Discussed by
Waite A. Cotton.....New York City

4:00 "Structural and Nervous Effects of Thumb Sucking"
By Earl W. Swinehart...Baltimore, Md.
Discussed by
Samuel J. Lewis.....Detroit, Mich.

HISTOLOGY, PHYSIOLOGY, PATHOLOGY, BACTERIOLOGY AND CHEMISTRY (RESEARCH)

(Auditorium—Third Floor, Room 13)

OFFICERS OF SECTION

Rudolf Kronfeld, Chairman.....Chicago, Ill.

Don J. Aubertine, Vice Chairman.....
.....San Francisco, Calif.

Rufus W. Leigh, Secretary.....
.....Fort Hancock, N. J.

2:30 to 5:00 p.m.

Cooperative Research on Dental Materials Between the National Bureau of Standards and the Research Commission of the American Dental Association.

2:30 "Testing of Materials Certified to Comply with Specifications of the American Dental Association"
By John R. Beall (B.S.).....
.....Washington, D. C.

3:00 "An Investigation of Toothpastes, Including a Federal Specification"
By Wilmer Souder (Ph.D.).....
.....Washington, D. C.

3:30 "Progress Report on the Study of Denture-Base Materials"
By W. T. Sweeney (A.B.).....
.....Washington, D. C.

4:00 "Silicate Cements—Physical and Chemical Properties and a Specification"
By George C. Paffenbarger.....
.....Washington, D. C.
Ira C. Schoonover (Ph.D.).....
.....Washington, D. C.

WEDNESDAY, JULY 14

OPERATIVE DENTISTRY, MATERIA MEDICA AND THERAPEUTICS

(Auditorium—First Floor, Room A)

9:30 a.m. to 12:00 m.

9:30 "Practical Prevention in Pedodontia"
By Walter T. McFall..Nashville, Tenn.
Discussed by
John C. Brauer .....Atlanta, Ga.

10:30 "Gold Foil and Platinum Centered Gold Foil; Methods of Condensation" (A report of continued investigations)
By R. W. Rule.....San Francisco, Calif.

11:30 "Orthodontia for the General Practitioner"
By David W. McLean.Los Angeles, Calif.

FULL DENTURE PROSTHESIS

(Auditorium—First Floor, Room C)

9:30 a.m. to 12:00 m.

9:30 "Relation of the Structures in the Region of the Ramus Mandibulae to the Extension of Artificial Dentures"
By Hugh W. MacMillan.Cincinnati, Ohio

10:15 "Keeping Denture Patients Young; Surgical Preparation of the Ridges" (Two films)
By Bert L. Hooper.....Lincoln, Nebr.
11:00 "The Periphery: Where Does It Begin and End?"
By G. E. Tilton.....Wichita, Kan.

PARTIAL DENTURE PROSTHESIS

(Auditorium—First Floor, Room B)

9:30 a.m. to 12:00 m.

9:30 "Balanced Occlusion in Restoring Lost Vertical Dimension"
By Paul A. Edmand.....Chicago, Ill.
10:15 "Balanced Occlusion"
By Rupert E. Hall.....Chicago, Ill.
11:00 "Essentials of Correct Fixed Bridge Restorations"
By Stanley D. Tylman.....Chicago, Ill.

ORAL SURGERY, EXODONTIA AND ANESTHESIA

(Auditorium—Second Floor, Ballroom)

9:30 a.m. to 12:00 m.

9:30 "Local Anesthetics and Vasoconstrictors as They Pertain to Dentistry"
By Howard C. Miller.....Chicago, Ill.
10:15 "Modern General Anesthesia as Applied to Oral and Dental Surgery in the Hospital"
By George H. Van Gilluwe (M.D.)....
.....New York City
11:00 "General Anesthesia in Office Practice"
By George W. Christiansen.....
.....Detroit, Mich.

ORTHODONTIA

(Auditorium—First Floor, Room E)

9:30 a.m. to 12:00 m.

9:30 "Twin Wire Appliance"
By Joseph E. Johnson.....Louisville, Ky.
10:15 "Further Observations on Ectopic Eruption of Permanent Teeth"
By Samuel J. Lewis.....Detroit, Mich.
11:00 "Mechanical Treatment of Anomalies"
By B. E. Lischer.....St. Louis, Mo.

PERIODONTIA

(Auditorium—First Floor, Room D)

9:30 a.m. to 12:00 m.

9:30 "Educating Ourselves to Educate the Public in Preventive Dentistry"
By George Wood Clapp..New York City
10:15 "Undergraduate Instruction in Periodontia"
By W. C. Graham.....Columbus, Ohio
11:00 "Use of Roentgen Rays in Periodontal Diagnosis"
By Henry C. Fixott.....Portland, Ore.

CHILDREN'S DENTISTRY AND ORAL HYGIENE

(Auditorium—Third Floor, Room 12)

9:30 a.m. to 12:00 m.

9:30 "Psychology and Children's Dental Practice"
By Frank F. Lamons.....Atlanta, Ga.
Discussed by
E. C. Geiger.....Jacksonville, Fla.
10:15 "Relationship of Pediatrics to Pedodontia"
By Russell R. Hippensteel (M.D.)....
.....Indianapolis, Ind.
Discussed by
Jacob M. Wisan.....Elizabeth, N. J.
11:00 "Prolonged Retention: When Should Healthy Deciduous Teeth Be Extracted?"
By George E. Morgan..Milwaukee, Wis.
Discussed by
Edward F. Sullivan.....Boston, Mass.

HISTOLOGY, PHYSIOLOGY, PATHOLOGY, BACTERIOLOGY AND CHEMISTRY (RESEARCH)

(Auditorium—Third Floor, Room 13)

9:30 a.m. to 12:00 m.

9:30 "Visualization of Scientific Oral Surgery"
By Sanford M. Moose.....
.....San Francisco, Calif.
9:50 "Use of Color Photography in the Teaching of Histology and Pathology" (With demonstrations)
By Charles H. Tozier (M.D.).....
.....Boston, Mass.
10:15 "Chemical Determination of Vitamin-C Deficiency as Related to Gingival Disease"
By Don C. Lyons.....Jackson, Mich.
10:35 "Routine Diet-Salivary Analysis at the Guggenheim Clinic"
By Frances Krasnow....New York City
11:00 "Composition of Enamel and Dentin from Carious Teeth"
By Marian L. LeFevre (M.S.).....
.....Rochester, N. Y.
Richard S. Manly (M.A.).....
.....Rochester, N. Y.

11:20 "The Emotions as a Factor in Dental Disease"
By William I. L. McGonigle.....Freehold, N. J.

OPERATIVE DENTISTRY, MATERIA MEDICA AND THERAPEUTICS

(Auditorium—First Floor, Room A)

2:30 to 5:00 p.m.

2:30 "Amalgam: The Necessity of a Consideration of Its Physical Properties and a Practical Technic"
By Ernest E. Cannon.La Crescenta, Calif.

3:30 "Improved Status of the Pulpless Tooth"
By Harry B. Johnston.....Atlanta, Ga.

Discussed by
U. G. Rickert.....Ann Arbor, Mich.

FULL DENTURE PROSTHESIS

(Auditorium—First Floor, Room C)

2:30 to 5:00 p.m.

2:30 "Esthetic Factors in Full Denture Construction"
By Victor H. Sears.....New York City

3:15 "Modern Denture Base Materials: What They Are"
By A. A. Nelson.....Royal Oak, Mich.

4:00 "Modern Denture Materials: What to Expect from Them"
By Horton D. Kimball....Detroit, Mich.

PARTIAL DENTURE PROSTHESIS

(Auditorium—First Floor, Room B)

2:30 to 5:00 p.m.

2:30 "Anatomy and Radiology of the Temporomandibular Joint, with Vertical Dimension for All Restorative Dentistry"
By T. W. Maves.....Cleveland, Ohio

3:15 "Balanced Occlusion in Relation to Lost Vertical Dimension"
By C. J. Stansbery.....Seattle, Wash.

4:00 "Surveying Partial Dentures Satisfactorily"
By Russell W. Tench....New York City

ORAL SURGERY, EXODONTIA AND ANESTHESIA

(Auditorium—Second Floor, Ballroom)

2:30 to 5:00 p.m.

2:30 "Correction of Prognathism by Section of the Mandibular Rami"
By James R. Cameron..Philadelphia, Pa.

3:15 "Oral Surgery and Radiation Therapy in Tumors of the Mouth"
By Douglas Quick (M.D.).New York City

4:00 "Surgical Lesions of the Mouth in Relation to the General Health"
By Lawrence Curtis....Philadelphia, Pa.

ORTHODONTIA

(Auditorium—First Floor, Room E)

2:30 to 5:00 p.m.

2:30 "Disharmonies in Human Dentition"
By Fred R. Blumenthal....Boston, Mass.

3:15 "Orthodontia—When and Why"
By Eugene J. Kelly.....Trenton, N. J.

4:00 "Age at Which to Begin Orthodontic Treatment"
By F. W. Nash.....Scranton, Pa.

PERIODONTIA

(Auditorium—First Floor, Room D)

2:30 to 5:00 p.m.

2:30 "Gingival Diseases"
By P. H. Belding.....Waucoma, Iowa
L. J. Belding.....Waucoma, Iowa

3:15 "Importance of Early Recognition and Treatment of Periodontoclasia"
By J. Clarence Salvas..Philadelphia, Pa.

4:00 "How to Educate the Family Dentist in Periodontia"
By Benjamin Tishler.....Boston, Mass.

CHILDREN'S DENTISTRY AND ORAL HYGIENE

(Auditorium—Third Floor, Room 12)

2:30 to 5:00 p.m.

2:30 "Radiodontia in Children's Dentistry"
By Clarence O. Simpson....St. Louis, Mo.

Discussed by
LeRoy M. Ennis.....Philadelphia, Pa.

3:15 "Root-Canal Therapy for Children"
By Elsie Gerlach.....Chicago, Ill.

Discussed by
Alfred Walker.....New York City

4:00 "Cavity Preparation for Deciduous Teeth"
By Ralph O. Wagner....Oakland, Calif.

Discussed by
Nathan B. Scherr.....Baltimore, Md.

HISTOLOGY, PHYSIOLOGY, PATHOLOGY, BACTERIOLOGY AND CHEMISTRY (RESEARCH)

(Auditorium—Third Floor, Room 13)

2:30 to 5:00 p.m.

2:30 "Recent Studies on Periapical Infection, Including Data Obtained from Human Necropsies"
By Lester W. Burket..New Haven, Conn.

3:15 "Our Changing Concept Regarding Pulpless Teeth"
By Louis I. Grossman..Philadelphia, Pa.

4:00 "Experimental Production of the Diffuse Atrophy Type of Periodontal Disease"
By Paul E. Boyle.....Boston, Mass.

4:20 "Oral Symptoms in a Case of Xanthomatosis; Some Differentiations and General Manifestations"
By L. W. Ender.....LaCrosse, Wis.

THURSDAY, JULY 15

OPERATIVE DENTISTRY, MATERIA MEDICA AND THERAPEUTICS

(Auditorium—First Floor, Room A)

9:30 a.m. to 12:00 m.

9:30 "Gold Inlays"
By R. E. Sturdevant.....Lincoln, Nebr.

10:30 "The Toilet of the Cavity"
By J. Russell Mitchell.....Atlanta, Ga.

11:00 "Anesthesia for Operative Dentistry"
By Fred R. Adams.....New York City

11:30 "Simplified Removal of Fixed Partial Dentures from the Mouth Without Destruction to Dentures, Teeth or Tissues"
By J. H. Sharon.....Cincinnati, Ohio

FULL DENTURE PROSTHESIS

(Auditorium—First Floor, Room C)

9:30 a.m. to 12:00 m.

9:30 "Immediate Dentures"
By Luzerne G. Jordan.Washington, D. C.

10:15 "Effects on the Head and Neck of Loss of the Vertical Dimension"
By H. L. Harris.....St. Paul, Minn.

11:00 "Development of the Cast Metal, Bolt-Retained Splint"
By L. Langdon Sheffield....Toledo, Ohio

PARTIAL DENTURE PROSTHESIS

(Auditorium—First Floor, Room B)

9:30 a.m. to 12:00 m.

9:30 "Comparison of the All-Porcelain Bridge with the Thimble Type"
By William A. Squires...New York City

10:15 "Preparation of the Mouth for Fixed and Removable Restoration"
By Frederick F. Molt.....Chicago, Ill.

11:00 "The Rôle of Crown and Bridge Prosthesis in Restorativ: Dentistry" (With colored lantern slides)
By Arthur O. Klaffenbach.....
.....Iowa City, Iowa

ORAL SURGERY, EXODONTIA AND ANESTHESIA

(Auditorium—Second Floor, Ballroom)

9:30 a.m. to 12:00 m.

9:30 "Associated Diseases of the Maxillary Sinuses and the Teeth"
By John E. Nyman.....Chicago, Ill.

10:15 "Important Lesions of the Oral Mucous Membrane" (Illustrated by lantern slides)
By Isadore Rosen (M.D.).New York City

11:00 "Central Osteomas and Cementomas—Their Diagnosis and Treatment"
By Kurt H. Thoma.....Boston, Mass.

ORTHODONTIA

(Auditorium—First Floor, Room E)

9:30 a.m. to 12:00 m.

9:30 "A Study in Five Hundred Adolescents of Orthodontic and Facial Changes and Effects on Dentition Attending the Loss of First Molars"
By J. A. Salzmann.....New York City

10:15 "Lingually Malposed Cuspids and Second Bicuspids"
By R. C. Willett.....Peoria, Ill.

11:00 "Temporomandibular Reactions to Occlusal Anomalies"
By Sidney E. Riesner....New York City

PERIODONTIA

(Auditorium—First Floor, Room D)

9:30 a.m. to 12:00 m.

9:30 "Effects of Certain Hormones on Gingival and Oral Mucous Membranes"
By Daniel E. Ziskin.....New York City

10:15 "Vincent's Infection"
By Samuel R. Parks.....Dallas, Texas

11:00 "Dietary Factors in Periodontal Disturbances"
By Harold J. Leonard....New York City

CHILDREN'S DENTISTRY AND ORAL HYGIENE

(Auditorium—Third Floor, Room 12)

9:30 a.m. to 12:00 m.

9:30 "The Business Phase of Dentistry for Children"
By Walter C. McBride....Detroit, Mich.
Discussed by
Burt B. Ide.....Baltimore, Md.

10:15 "An Analysis of Two Nation-Wide Dental Surveys"
By Frank C. Cady....Washington, D. C.

Discussed by
H. Shirley Dwyer.....Brooklyn, N. Y.

11:00 "An Organized Effort to Promote Dentistry for Children and What It Is Accomplishing"
By E. L. Pettibone.....Cleveland, Ohio

HISTOLOGY, PHYSIOLOGY, PATHOLOGY, BACTERIOLOGY AND CHEMISTRY (RESEARCH)

(Auditorium—Third Floor, Room 13)

9:30 a.m. to 12:00 m.

9:30 "Incidence of Dry Socket"
By Harold W. Krogh. Washington, D. C.

9:50 "Is Surgical Intervention Warranted in Cases of Submerged Apices, Hypercementosis, Root Resorption and Osteosclerosis?"
By James L. Zemsky.....New York City

10:15 "Research on Dentin Anesthesia, Including a Report on a New Dentin Anesthetic, Thymol Aminobenzoate"
By Harold A. Osserman..New York City
A. Taub (A.M.).....New York City

Discussed by
Samuel M. Gordon.....Chicago, Ill.

11:00 "Study of Experimental Dental Caries in Rats"
By Gerald J. Cox (Ph.D.). Pittsburgh, Pa.

11:20 "Genesis of the Periodontium"
By Theodore B. Beust ....Louisville, Ky.

Atlantic City beach.

GENERAL CLINIC PROGRAM

THURSDAY AFTERNOON AND FRIDAY, JULY 15-16

SECTION CLINICS

Operative Dentistry, Materia Medica and Therapeutics

"Amalgam: The Necessity of a Consideration of Its Physical Properties, and a Practical Technic"
Ernest E. Cannon....La Crescenta, Calif.

"Gold Foil: Methods of Condensation"
R. W. Rule.....San Francisco, Calif.

"Fundamentals Involved in Prescribing Restorative Dental Remedies and Articulation of Human Teeth"
B. B. McCollum.....Los Angeles, Calif.
Charles E. Stuart.....Ventura, Calif.
Donald G. MacQueen.Los Angeles, Calif.
Lynn Wightman.....Los Angeles, Calif.

Orthodontia

"Roentgenograms of Condyles in Bite Anomalies"
Sidney E. Riesner.....New York City

"Labial and Lingual Arch Construction" (Motion pictures)
Van A. Stilley, Jr.....Paducah, Ky.

"Devices Which Intercept Malocclusion"
Leonard Kohn.....Brooklyn, N. Y.

"Practical Orthodontia Appliances with Casts of Cases Before and After Treatment on Which Appliances Were Used"
Eva R. Hastings.....Des Moines, Iowa

"Orthondontic Treatment"
Howard J. Buchner.....Oak Park, Ill.

"Models Indicating Mesial Drift"
Howard E. Strange.....Chicago, Ill.

Children's Dentistry and Oral Hygiene

"The Nutrition History in Relation to Dental Problems"
Nina Simmonds (Sc.D.).....
.....San Francisco, Calif.

"Root-Canal Therapy for Children"
Robert G. Kesel.....Chicago, Ill.

"Juvenile Psychodontia"
E. C. Geiger.....Jacksonville, Fla.

"Types of Class IV Inlays Used in Operative Dentistry"
Luther W. Fetter.....Baltimore, Md.

"Deciduous Tooth Cavity Preparation and Treatment of Fractured Incisors"
Nathan B. Scherr.....Baltimore, Md.

"Root-Canal Therapy"
Morris Cohen.....New York City

INDIVIDUAL AND GROUP CLINICS

"Oral Surgery and Exodontia"
George W. Matthews..Birmingham, Ala.

"Ceramics"
L. Z. McClung.....Birmingham, Ala.

"Amalgam"
C. C. Cannon.....Fayette, Ala.

"Place of Electrocoagulation in the Treatment of Pyorrhea"
M. H. Gray.....Little Rock, Ark.

"Investing and Casting Inlays"
G. L. Dummit.....Compton, Calif.

"Three Dimensional Radiography by the Superimposing Technic"
J. C. Almy Harding....San Diego, Calif.

"Oral Pathologic Specimens; Preoperative and Postoperative Conditions"
Carl D. Lucas.....Los Angeles, Calif.

"Orthodontics for the General Practitioner"
David W. McLean...Los Angeles, Calif.

"Operative Radiodontia; Interpretive Radiodontia"
Walter S. Thompson..Los Angeles, Calif.

"Treatment of Fracture of the Mandible"
Chester H. Webber.....San Diego, Calif.

"Value of Preoperative Medication"
Frank S. Kaiser.....Los Angeles, Calif.

"Invisible Class Three Gold Foil Filling, Using Pneumatic Condenser" (Combination chair and table clinic)
Vernon R. Swan.....Pasadena, Calif.
Leroy E. Knowles.....Los Angeles, Calif.
Russell W. Bassett...Los Angeles, Calif.

"Electrocoagulation in the Treatment of Pyorrhea Alveolaris"
William F. Lawrenz..Long Beach, Calif.

"This Partial Denture Problem of Ours"
George A. Selleck..San Francisco, Calif.

"Precision in Dental Porcelain" (A motion picture)
Garnet R. Bassett...San Francisco, Calif.
W. L. Stansbury.....Palo Alto, Calif.

"New and More Efficient Method of Reducing Complicated Fractures of the Maxilla and Mandible Without Splints"
Bryant S. Carroll.....Jacksonville, Fla.

"Rôle of the Practitioner in Preventing and Intercepting Malocclusion"
Abraham Goldstein.....Chicago, Ill.

"Exodontia and Oral Surgery" (Natural color motion picture, showing operations for the removal of teeth and oral surgery)
Menifee R. Howard.....Denver, Colo.

"New Fixed-Bridgework Technic"
Harry Spiro.....Chicago, Ill.

"Clinical Oral Surgery"
Emil L. Aison.....Chicago, Ill.

"Use of Temporary Orthopedic Dental Splints for Relief of Condyle Pressure in the Glenoid Fossa"
R. L. Wescott.....Evanston, Ill.

"Gnathostatic Diagnosis in Orthodontia"
B. L. Herzberg.....Chicago, Ill.

"Balanced Occlusion"
Hall Research Group,
Rupert E. Hall, director....Chicago, Ill.

"A Simple Yet Practical Device for Thumb-sucking Cases"
Wesley C. Darby.....Des Moines, Iowa

"A Simplified Denture Technic"
Roy M. Smith.....Iowa Falls, Iowa

"Cast Attachments for Fixed Partial Dentures"
Ray V. Smith.....Iowa City, Iowa

"Simplified Bookkeeping for Dentists"
R. H. Koenig.....Charles City, Iowa

"Indications for Alveolomerotomy (Partial Alveolectomy)"
Paul E. Finley.....Bogalusa, La.

"Construction of Onlays Eliminating Cutting Distal Interproximal Surface; Ideal Upper Fixed Bridge Attachment"
M. F. Jarrell.....Alexandria, La.

"Dry-Socket Treatment"
Norbert E. Perret.....Jeanerette, La.

"Exodontia"
Henry B. Clark.....St. Paul, Minn.

"Building All Types of Dental Restorations to Accurate Balance and Function, Using Only a Plain Line Articulator"
Frederick S. Meyer..Minneapolis, Minn.

"Immediate Denture Service" (Moving pictures in Section on Full Denture Prosthesis)
C. O. Flagstad.....Minneapolis, Minn.

"Shoulderless Porcelain-Jacket Crowns and Porcelain Bridges"
Ralph H. Boos.....Minneapolis, Minn.

"Procedure for Survey in Mouth Reconstruction"
George W. Boos.....Minneapolis, Minn.

"Anterior Dovetail Inlays"
R. F. Ioset.....Long Prairie, Minn.

"Simplified Dental Health Education in Private Practice"
Joan Geyer (hygienist).....
.....Grey Eagle, Minn.

"Educational Work in Minnesota"
Frances Erskine (hygienist).....
.....St. Paul, Minn.

"Stabilization of Lower Dentures by Incorporating Principles of Various Technics"
V. H. Storberg.....St. Paul, Minn.

"Demonstration Models"
Ray F. Goering.....Duluth, Minn.

"Construction of Anterior Bridge Abutments"
F. A. Heiberg.....Northfield, Minn.

"Immediate Dentures—Non-Surgical"
W. A. C. Ochs.....Mankato, Minn.

"Lower Anterior Pontics; Porcelain and Gold Castings"
Earl J. Poe.....St. Louis, Mo.

"Occlusion—Non-Anatomic Versus Anatomic"
Dayton Dunbar Campbell.....
.....Kansas City, Mo.

"Treatment of Face Fractures"
Donald E. Woodard...Kansas City, Mo.

"Fractures of the Mandible"
Morven T. Curran....Kansas City, Mo.

"Manifest tions of Syphilis"
C. Kenneth Ramage....Kansas City, Mo.

"Curved Cusp Posterior Teeth; Hydraulic Impression Technic for Full Upper and Lower Dentures"
H. F. McGrane.....Omaha, Nebr.

"Management of Pulpless Teeth"
W. Clyde Davis.....Lincoln, Nebr.

"Temporary Bridges"
Ralph L. Ireland.....Lincoln, Nebr.

"Mysticism of Gold Casting Technic"
R. E. Sturdevant.....Lincoln, Nebr.

"Porcelain Inlays—A Correctable Reinvestment Technic"
Louis Citron.....White Plains, N. Y.

"Nitrous Oxide-Oxygen and General Anes-

thesia for the Dental Practitioner"
Lawrence Lee Mulcahy....Batavia, N. Y.

"Surgical Preparation of the Mouth for Dentures"
K. L. Johnson.....Raleigh, N. C.

"A Method of Establishing Balanced Occlusion, Determining That Open Bite Case will Be Correct"
John A. McClung. Winston-Salem, N. C.

"Preparation of a Tooth for Porcelain Jacket Crown"
R. Philip Melvin..Winston-Salem, N. C.

"Mandible Fracture Appliance Permitting Mastication Day After Appliance Is Placed; Appliance for Reduction of Condyloid Process Fracture"
J. W. Stanley.....Wilmington, N. C.

"Baked Porcelain Inlays Without Use of Matrix"
William F. Bell.....Asheville, N. C.

"Short Cuts in Casting and Laboratory Technic"
C. I. Miller.....Albemarle, N. C.

"Extra-Oral Mandibular Nerve Block"
Carey T. Wells.....Canton, N. C.

"Cohesive Inlays in Small Cavities"
J. A. Sinclair.....Asheville, N. C.

"Retaining and Restoring a Fractured Mandible"
L. L. Sheffield.....Toledo, Ohio

"Diagnosis, Deflections, Deformities and Jaw Malformations"
A. Van Ark.....Toledo, Ohio

"Removal of Bony Growths from the Palate"
V. B. Dalton.....Cincinnati, Ohio

"Photomicrographs of Pulp Calcification, Ground and Decalcified Sections"
W. G. Adair.....Cincinnati, Ohio

"Errors Developed by Use of the Central Bracing Point in the Adjustment of Articulators"
Carl O. Boucher.....Columbus, Ohio

"A Scientific Method for Selecting Artificial Teeth Harmonious in Form and Size with the Face Form"
A. J. Bush.....Columbus, Ohio

"Prosthetic Restorations in Mutilation of the Face and Lips"
Irwin S. Warm.....Cincinnati, Ohio

"Orientation of the Head in Clinical Photography"
Bruce A. Curran.....Cleveland, Ohio

"Accurate Anatomic Reproductions of Tooth Form and Size, Cast and Swaged"
T. S. Malson.....Cleveland, Ohio

"Artificial Stone Trays for Corrective Impressions"
Joseph J. Wittenberg....Cincinnati, Ohio

"Removing the Personal Equation from Inlay Casting"
Carl H. Scheu.....Lakewood, Ohio

"Direct Inlay Wax Patterns by Means of Hydraulic Pressure"
Earl J. Spencer.....Dayton, Ohio

"Immediate Denture Service"
Luzerne G. Jordan....Washington, D. C.

"Full Dentures" (Progressive table clinic)
Ewell Neil .....Nashville, Tenn.
J. B. Neil.....Nashville, Tenn.
E. I. White.....Greenville, Tenn.
C. V. Morgan.....Johnson City, Tenn.
J. M. Burleson.....Johnson City, Tenn.
R. P. Moss.....Kingsport, Tenn.
G. F. Mathes.....Greenville, Tenn.

"Surgery"
W. B. McCall.....Temple, Texas

"Reinforced Porcelain"
T. V. Connor.....Dallas, Texas

"Electrocoagulation in Treatment of Class 2 Pyorrhea Pockets"
Howard G. Malitz.....Dallas, Texas

"Circumferential Wiring in Fracture of Edentulous Mandibles, Unilateral and Bilateral"
A. C. Sloan.....Dallas, Texas

"Dacryocyst of Dental Origin: Report of Case"
Franz William Stumpf.....
.....San Antonio, Texas

"Full Upper and Lower Immediate Denture Technic" (Colored moving picture accompanied by models of patient)
T. H. Kennedy.....Dallas, Texas

American Dental Assistants Association

Alabama:

"Amalgam—Its Use and Abuse"
Alabama Dental Assistants Association

California:

"The Dental Assistant as a Private Secretary"
Alameda County Dental Assistants Association

"Laboratory Efficiency"
Los Angeles Dental Assistants Association

"Indirect Inlay Investment Technic"
Los Angeles Dental Assistants Association

Michigan:
"Diet: Education of the Patient"
Detroit Dental Assistants Association

Minnesota:
"Simplified Dental Health Education in Private Practice"
Minnesota Dental Hygienists and Assistants Association

New Jersey:
"Sterilization"
"Study Models and Records in Orthodontia"
"Simple Denture Repairs"
New Jersey State Dental Assistants Association

Tennessee:
"Chair Assistance"
"Collections"
Tennessee State Dental Assistants Association

Virginia:
"The Child Patient"
Richmond Dental Assistants Association

American Dental Hygienists' Association

"Instrumentation (Various Methods)"
Emily Albanese.....New York City
Ruth Heck.....Philadelphia, Pa.
Mary Owen.....Kenmore, N. Y.

"The Hygienist Assisting the Orthodontist in Laboratory Technic"
Esther Ellis.....Philadelphia, Pa.

"Brushing and Massage Technic"
Vivian Frederick.....Washington, D. C.
Eleanor Dodd.....Washington, D. C.

"Private Lives of the Baby Teeth Made Public"
Helen C. MacNally.....New York City

"Dental Health Education: The Private Office"
Frances Stoll.....Garden City, N. Y.

"The Dental Hygienist as a Health Educator"
Illinois Dental Hygienists Association

"Educational Work in Minnesota"
Minnesota State Dental Hygienists Association

"Dental Hygiene Welfare Work in Massachusetts"
Anne E. Wiltshire

FIRST DISTRICT

"Periodontia"
Lewis Fox.....South Norwalk, Conn.

"Full Dentures"
Kenneth C. Johnson..New London, Conn.

"Daily Oral Diagnosis for the General Practitioner, with Economic Considerations"
Donald F. Lane.....Hartford, Conn.

"Chronic Recurrent Vincent's Infection"
J. Leo Loftus.....Meriden, Conn.

"Cavity Preparation of Anterior Teeth for Three-Quarter Inlays"
Robert C. Lonergan..New London, Conn.

"Preparation of the Mouth for Immediate Dentures, Employing Nitrous Oxide-Oxygen Anesthesia"
Robert W. Whitcomb....Hartford, Conn.

"Simplification of Certain Dental and Orthodontic Procedures by the Solderless Band and Instruments"
M. R. LeBow.....Providence, R. I.

"Porcelain Bridgework"
George J. Anderson.....Portland, Maine

"The Mandibular Third Molar"
Wells A. Daniels.....Springfield, Mass.

"Extension of Lower Dentures Below Mylohyoid Ridge for Retention"
William H. Newton....Worcester, Mass.

"Appliance to Promote Growth of the Mandible in Young Patients"
William H. Gilpatric.....Boston, Mass.

"Jacket-Crown Preparation Under Analgesia"
G. M. Teasdale.....New Bedford, Mass.

"Trisurface Crown"
Ivor P. Muzzey.....Athol, Mass.

"Procaine and Anatomic Landmarks"
David D. Bloom.....Boston, Mass.

"Original Appliance for the Treatment of Open Bite"
Sidney P. Stone.....Dorchester, Mass.

"Restoration of Occlusion to Normal Function"
Edward L. Soares...New Bedford, Mass.

"Partial Dentures"
Roger J. Edwards.....Danvers, Mass.

"Practical Evaluation of the Diet"
Wendell G. Ahern.....Pittsfield, Mass.

"Exodontia"
William M. McIntosh.....Boston, Mass.

"The Dental Machine"
E. Melville Quinby.....Boston, Mass.

"A Plea for the Conservation of the Deciduous Tooth"
Oscar L. Perrault.....Hudson, Mass.

"Some Impressive Dental Restorations"
Harmon A. Shohet.....Boston, Mass.

"The Ultraviolet Ray in Orthodontics"
George T. Baker.....Boston, Mass.

"Hollow Gold Inlays"
Copeland Merrill.....Wellesley, Mass.

"Visual Education—An Aid to Better Dentistry"
Edward W. Peasley....Rockland, Maine

"Copper Deposition for Inlay Dies"
G. Earle Thompson.....Boston, Mass.

"Dental Therapeutics"
Arthur T. Palmer.....Lynn, Mass.

"Cancer Exhibit from the Tumor Clinic, Beth Israel Hospital, and the Department of Oral Pathology, Harvard Dental School"
M. Michael Cohen.....Boston, Mass.

"Immediate Denture Service"
John C. Stanton.....Danvers, Mass.

"Dentistry in Public Health"
Florence B. Hopkins, Dept. Public Health.....Boston, Mass.

"Anesthesia: Local and Regional Technic of Injections"
James H. Maycock..East Gardner, Mass.

"Gold Inlays"
Edwin M. Scribner.....Boston, Mass.

"Gold Foil—Its Use in Everyday Practice"
Philip John Pinel.....Boston, Mass.

"Gold Inlay Slice Preparation, Indirect Method"
S. Irving Copen.....Boston, Mass.

"Case Reports"
Ralph W. Short.....Boston, Mass.

SECOND DISTRICT

"Restoration of Children's Teeth with Mat Gold and Cast Gold"
Paul W. Zillman.....Buffalo, N. Y.

"Pinlock Inlays"
Frederick A. Romberg.....
.....White Plains, N. Y.

"Amalgam Restorations"
Harry H. Manville..Kew Gardens, N. Y.

"Uses and Abuses of Silicate Cements"
E. J. C. Smith. Westhampton Beach, N. Y.

"New Methods of Placing Porcelain Inlays in Narrow Spaces; Porcelain Corners for Front Teeth; Utilizing Porcelain to Hide Gold"
William A. Spring.....New York City

"Porcelain Restorations"
H. Spalding Both.....New York City

"Porcelain Bridges"
William A. Squires.....New York City

"Porcelain Jacket Crowns"
Carlisle C. Bastian.....New York City

"Molded Porcelain: Simple Procedure for Construction of Jacket Crown, Porcelain Bridge and Porcelain Pontic"
Frederick H. Doner....Watertown, N. Y.

"Immediate Dentures for the Average Dentist"
Amos G. Stiker.....Addison, N. Y.

"Simplifying the Muscle Trimming of Full Compound Impressions"
E. S. Ulsaver.....New Rochelle, N. Y.

"Molded Porcelain and Resin as Materials for Full Dentures"
Henry C. McBrair....Middletown, N. Y.
H. J. Cornell.....Darien, Conn.

"Designing Saddles for Partial Dentures"
Ferdinand H. Neurohr...New York City

"Diagnosis, Prognosis and Treatment of Periodontal Disease"
Samuel Charles Miller...New York City

"Tissue Changes Following Periodontal Treatment" (With moving picture of treatment)
Sidney Sorrin.....New York City

"Simplified Surgical Treatment for Eradication of Pyorrhea Pockets Under Topical Anesthesia"
Lillian Barkann.....New York City

"A Technic for Indirect Inlays Minimizing Difficulties Frequently Encountered"
E. G. Van Valey.....New York City

"Root-Canal Therapy"
Jacob B. Schneer.....New York City

"Influence of Surface Tension of Drugs Used in Root-Canal Therapy"
Maurice Buchbinder.....New York City

"Children's Dentistry as an Avenue Toward Stabilizing and Insuring the Future Practice of the General Practitioner"
Guy W. Patterson.....Batavia, N. Y.

"Pulpotomy"
Clifford J. Waas.....New York City

"Protecting the Pulp in Deciduous Teeth"
Eugene J. North.....Buffalo, N. Y.

"Fixed Bridgework"
Simon Shapiro.....Brooklyn, N. Y.

"Construction of Abutments and Fundamentals of Crown and Bridge Restorations"
J. R. Schwartz.....Brooklyn, N. Y.

"Modernized Fixed-Bridge Construction"
Herbert H. Kabnick.....New York City

"Fixed Bridgework in Whole-Mouth Rehabilitation"
Karl W. Knapp.....New York City

"New Type of Sanitary Fixed Bridge as the

Basic Unit for Scientific Dental Restorations"
Steven G. Nicholson.....New York City

"Ankylosis of the Temporomandibular Joint"
Douglas B. Parker.....New York City

"Forceps and Elevator Technic in Exodontia"
James J. Ivory.....Staten Island, N. Y.

"Use of Exolevers and Ossisectors in the Removal of the Mandibular Third Molar"
Jacob J. Alper.....Brooklyn, N. Y.

Radiologic Studies of Lesions of the Mouth, Preoperatively and Postoperatively; Surgical Procedure"
J. A. Greenhouse.....Rochester, N. Y.

"Methods of Obtaining Profound Local Anesthesia; Nerve-Block Injections Demonstrated on Dissected Wet Specimen"
Herman L. Reiss.....New York City

"Local Anesthesia: Intra-Oral and Extra-Oral Injections of the Trigeminal Nerve" (Illustrated with motion pictures)
Irving Salman.....New York City

"General Anesthesia"
Harry M. Moss.....New York City

"Does Orthodontic Treatment Produce or Increase Caries?"
Jerome H. Trier.....New York City

"Electrocoagulation in Pyorrhea Treatment"
Donald E. Decker.....Brooklyn, N. Y.

"Analgesia in Operative Dentistry"
Morris Fierstein...Queens Village, N. Y.

"Orthodontia"
Glenn H. Whitson.....Brooklyn, N. Y.

"Orthodontic Treatment Employing the Angle Edgewise Arch Mechanism (Case Reports)"
Leon D. Bryant.....Syracuse, N. Y.

"Orthodontia, Its Relationship to the Other Branches of Dentistry"
Samuel Hemley and Group, New York University, College of Dentistry.....New York City

"Analgesia in Operative Dentistry"
James F. Henegan.....New York City

"Drugs of Use in Periodontal Treatment"
J. Lewis Blass.....New York City

"Various Technics of Immobilizing the Fractured Mandible and Maxillae"
William A. Fennelly....New York City

"Interpretation of Electric Pulp Test Findings"
Theodore Kaletsky.....New York City

"Simplified Film Holder"
Arthur S. Litten.....New York City

"Standardized Technic for the Removal of Pulps, Filling of Canals and Treatment of Putrescent Teeth"
Charles Ogur.....Brooklyn, N. Y.

"Filling a Cervical Cavity with Foil" (Chair clinic)
Benedict S. Hert.....Rochester, N. Y.

"Prosthodontia of Anatomic Teeth in Trial Dentures"
Barnett Kessler.....New York City

"Highlights and Pitfalls in Indirect Gold-Inlay Procedure"
Ben R. Bronstein.....New York City

"Scientific Methods and Practical Results in Orthodontia"
M. A. Munblatt.....New York City

"Gas-Oxygen Anesthesia"
Harry M. Seldin.....New York City

Brooklyn Study Club

"Manipulation of Soft Tissue in Exodontia"
Joseph M. Glaser.....Jamaica, N. Y.

"Fixed Bridgework"
Lawrence J. Dunn.....Brooklyn, N. Y.

"Full Dentures"
Charles M. McNeely....Brooklyn, N. Y.

"A Few Time, Labor and Money Saving Devices"
Fred R. Adams.....New York City

"Forceps Technic in Exodontia"
Charles A. Wilke.....New York City

"Pinledge Inlays"
Robert L. Heinze.....Brooklyn, N. Y.

"Burnished Gold Foil"
Leon R. Atwood.....Brooklyn, N. Y.

"Indirect Inlay Technic"
Joseph A. Burgun.....Brooklyn, N. Y.

"Porcelain-Faced Cast Shoulderless Jacket Crown"
Joseph A. Viverito.....Brooklyn, N. Y.

"New Form of Treatment of Osteomyelitis Using Insulin"
Gustaf B. Johnson.....Brooklyn, N. Y.

"Cement Bases for Cavity Preparation and Restoration of Angles in Incisor Teeth"
Rudolph H. Reese.....Brooklyn, N. Y.

"Orthodontia for the General Practitioner"
William McGill Burns...Brooklyn, N. Y.

"Preoperative and Postoperative Treatment"
C. Raymond Wells.....Brooklyn, N. Y.

"Various Means of Exacting Impressions and Bite Registration for Teeth and Small Restorations"
Frank J. McLaren, Jr.....New York City

THIRD DISTRICT

"Compound Impressions and Wax Patterns for Gold Inlays"
Harry C. Best.....Philadelphia, Pa.

"Silicate Cements"
J. A. Eberly, Jr.....Philadelphia, Pa.

"Porcelain Inlays, Including Those Involving the Incisal Edge"
Henry W. Brandt.....Scranton, Pa.
James J. MacMillan....Carbondale, Pa.

"Operative Dentistry"
Walter H. Fordham.....Scranton, Pa.

"Casting Gold Inlays"
C. T. Powers.....Nicholson, Pa.

"Gold Foil and Amalgam"
John J. Cane.....Phillipsburg, N. J.

"Operative Technic (Gold Foil)"
O. G. Longenecker.....Mt. Joy, Pa.

"Selection and Adaption of Porcelains for Artificial Dentures"
Harlan B. Greeson....Philadelphia, Pa.

"Aids in Taking Full Upper and Lower Compound Impressions; Obtaining a Functional Bite"
Louis Shrallow.....Connellsville, Pa.

"Securing Centric Relation and Balanced Occlusion"
H. K. Willits.....Reading, Pa.

"Electrolysis as Applied to the Formation of Dental Casts and Denture Bases"
P. H. Richardson.....Erie, Pa.

"Prosthodontia"
T. B. Garvey.....Lancaster, Pa.

"Problem of Stabilization of Full Lower Dentures"
E. Julian Ohn.....Philadelphia, Pa.

"The Porcelain Veneered Cast Jacket Crown (Practical Demonstration, Including Making of Wax Pattern)"
E. A. Boreth.....Philadelphia, Pa.

"Attachment Bridges"
A. Ross Crane.....Philadelphia, Pa.

"Prosthetic Uses for Black Carding Wax"
R. E. Denney.....Philadelphia, Pa.

"Soldering Technic"
A. D. Preston.....Scranton, Pa.

"Fixed Bridgework"
Saul Levy.....Scranton, Pa.

"Shoulderless Porcelain-Jacket Crowns"
D. Staples Gardner.....Scranton, Pa.

"Reinforced Platinum Matrix for Porcelain Jacket Crowns"
John Evans.....Scranton, Pa.

"Simple Type of Loose-Link Fixed Bridge"
Fred H. Hoeffer.....Reading, Pa.

"Simplified Technic for Constructing Full Cast Pinledge"
Charles N. Fiero.....Erie, Pa.

"Partial Restorations"
C. V. Snyder.....Lancaster, Pa.

"Vincent's Infection"
S. Leonard Rosenthal..Philadelphia, Pa.

"Partsch Operation for Dental Cysts"
John Paul Jones.....Scranton, Pa.

"Maxillary and Mandibular Cysts"
James G. Morgan.....Scranton, Pa.

"The p_H of Local Anesthetic Solutions"
B. M. Brickman.....Philadelphia, Pa.

"Local Anesthesia"
Emmett O'Neill.....Philadelphia, Pa.

"Regional Anesthesia in the Maxilla: Extra-Oral Technic of Injection of the Second Division of the Fifth Nerve at the Infra-Orbital Canal Through the Foramen"
L. M. Saghirian.....Philadelphia, Pa.

"Anesthetic Collapse: Prevention and Remedies"
Victor H. Frank.....Philadelphia, Pa.

"Postoperative Check-Up and Treatment in Exodontia and Minor Oral Surgery"
Guy L. Haman.....Reading, Pa.

"Exodontia"
R. E. McLaughlin.....Easton, Pa.

"When and Why of Orthodontia"
Geneva E. Groth.....Philadelphia, Pa.

"Orthodontia"
F. W. Nash.....Scranton, Pa.

"Orthodontia"
Wilson M. Skinner.....Easton, Pa.

"Periodontics"
Clarence S. DeLong.....Reading, Pa.

"Practical Instrumentation for the Conservative Treatment of Periodontal Lesions"
Jacoby T. Rothner.....Philadelphia, Pa.

"Correction of Malocclusion and Treatment of Mandibular Joint Abnormalities"
David J. Goodfriend...Philadelphia, Pa.

"Simplicity of Surgical Preparation of the Mouth for Dentures"
Albert Goho.....Harrisburg, Pa.

"Economics"
Howard S. Seip.....Allentown, Pa.

"Economics"
C. J. M. Raker.....Allentown, Pa.

"Historical Clinic" (Instruments dating back to early fifties)

H. D. Graham.....Brownsville, Pa.

"Crowns and Bridgework"
A. G. Eglin.....Philadelphia, Pa.
E. R. Gilda.....Philadelphia, Pa.

"Local Anesthesia"
Naysh C. Brennan.....Shenandoah, Pa.

"Pin Inlays, Direct Technic"
Paul E. Bomberger.....Lancaster, Pa.

University of Pennsylvania Dental School

"Dental Prosthesis"
Ernest L. Carr.....Philadelphia, Pa.
Hugh McWilliams.....Philadelphia, Pa.
Thomas Conner.....Philadelphia, Pa.

"Operative Dentistry"
Harold Craigin.....Philadelphia, Pa.
Norman R. Haig.....Philadelphia, Pa.
Raymond Werther.....Philadelphia, Pa.
A. H. Dillon.....Philadelphia, Pa.
E. A. Knorr.....Philadelphia, Pa.

"Roentgenology"
Leroy M. Ennis.....Philadelphia, Pa.

Temple University School of Dentistry

"Cavity Preparation and Impression Taking for Baked Porcelain Restorations"
W. S. Baglivo.....Philadelphia, Pa.

"Construction of Soft Gold Inlays by the Direct Method"
S. D. Carmick.....Philadelphia, Pa.

"Helpful Methods of Inserting Silicates"
Harold L. Faggart....Philadelphia, Pa.

"Construction of a Combination Fibrous and Crystalline Gold Foil Filling by Hand and Mechanical Mallet Condensation"
L. E. Hess.....Philadelphia, Pa.

"Gold Inlay Restoration by the Indirect Method"
H. J. Lord.....Philadelphia, Pa.

"Manipulation, Insertion and Finishing of Amalgam Fillings"
W. C. Miller.....Philadelphia, Pa.

"Some Phases of Operative Work with the Aid of Local Anesthesia"
A. L. Ventura.....Norristown, Pa.

"Oxygenation, Electrocoagulation and Ultraviolet Therapy in the Treatment of Periodontal Lesions"
Frederick James .....Philadelphia, Pa.

"Dental Prescriptions"
John H. Githens.....Philadelphia, Pa.

"Full Denture Prosthesis"
David W. Bell.....Philadelphia, Pa.

"Dental Prosthesis"
Dorothy B. Waugh....Philadelphia, Pa.

"Clasps for Retention in Partial Denture Restorations"
L. M. Grisbaum.....Landsdowne, Pa.

"Treatment and Filling of Deciduous Teeth"
Theodore D. Casto.....Philadelphia, Pa.
B. E. Beatty.....Philadelphia, Pa.
Ernest F. Ritsert.....Philadelphia, Pa.

Dental Clinic Club of Philadelphia

Ceramics (W. W. Powell, director)

"Porcelain Jacket Crown"
W. W. Powell.....Philadelphia, Pa.

"Porcelain Inlay Tip"
F. M. Harrison.....Philadelphia, Pa.

"Porcelain Inlays"
Raymond S. Clarke....Philadelphia, Pa.

"Porcelain Inlays Without the Use of Matrices"
James I. Woolverton.....Trenton, N. J.

"Staining and Glazing Artificial Teeth, Jacket Crowns, Porcelain Pontics, Etc."
H. Vernon Lapp.....Elkins Park, Pa.

Dentistry for Children

"Operative Dentistry for Children and Child Management"
Gustav C. Tassman....Philadelphia, Pa.

"Prosthetic Appliances for Preschool Children"
Richard C. Mears.....Cynwyd, Pa.

Exodontia

"Exodontia Hints"
William J. Asprey....Prospect Park, Pa.

"Removal of Maxillary and Mandibular Roots by Exolever Technic"
D. C. Turkington.....Chester, Pa.

"Preparation of the Patient for the Removal of Teeth"
George C. Davis.....Philadelphia, Pa.

"A New Topical and Conductive Anesthesia"
L. Biddle Duffield.....Philadelphia, Pa.

Full Dentures (Frank A. Fox, director)

"Immediate Replacements"
M. M. DeVan.....Philadelphia, Pa.

"Modeling Compound Impressions and Compound 'Denticol' Impressions"
Ralph Deshon .....Philadelphia, Pa.

"Corrected Plaster Impressions"
Arthur C. Benson.....Philadelphia, Pa.

"Maxillomandibular and Temporomandibular Relationships"
Benjamin Benedict ....Philadelphia, Pa.

"Artistic Staining of Artificial Teeth"
David L. Mackey.....Philadelphia, Pa.

"Boxing and Pouring of Stone Casts; Relative Value of Stones and Compounding of Materials Used for Impression Work"
Andrew J. Seeler.....Philadelphia, Pa.

"Preliminary Records Taken Before Extraction of Teeth, Preceding Denture Construction"
Frank E. Chumar.....Philadelphia, Pa.

"Phonetics as Related to Denture Construction"
George J. Roth.....Philadelphia, Pa.

"Problems Associated with Denture Prosthetics"
Frank A. Fox.....Philadelphia, Pa.

Partial Dentures (Rupert G. Beale, director)

"Partial Denture Surveying"
Rupert G. Beale.....Philadelphia, Pa.

Operative Dentistry (Gustav C. Tassman, director)

"Gold Foil Technic"
William J. Palanky.....Trenton, N. J.

"Cement and Amalgam Restorations with Use of Matrix Producing Greater Retention and Ease of Manipulation"
Wadea Kassab .....Chester, Pa.

"Amalgam Restorations"
Herbert D. Shields.....Philadelphia, Pa.

Orthodontia (Andrew F. Jackson, director)

"Orthodontia"
Andrew F. Jackson....Philadelphia, Pa.
Aubrey P. Sager.....Philadelphia, Pa.
P. V. Reid.....Philadelphia, Pa.
Harry B. Wright.....Philadelphia, Pa.
Charles H. Patton.....Philadelphia, Pa.

Periodontia (Herbert L. Fischer, director)

"Sharpening of Instruments"
John H. Greene.....Philadelphia, Pa.

"Home Care of the Mouth"
William A. C. Bester...Philadelphia, Pa.

"Electrocoagulation"
Herbert L. Fischer.....Philadelphia, Pa.

"Control of Cervical Cavities in Periodontoclasia"
A. L. Orr.....Philadelphia, Pa.

Restorative Dentistry (W. J. Robinson, director)

"Construction of Anterior Bridge Attachments, Stressing Tooth Conservation"
Edward A. Manning.....Chester, Pa.

"Construction of Posterior Bridge Attachments, Stressing Tooth Conservation and Construction of Other Types of Bridge Attachments"
Aelyas Kassab .....Chester, Pa.

"Indirect Gold Inlays: Cavity Preparation, Impression Taking Models, Burning Out, Shrinkage, Etc."
Howard K. Mathews..Philadelphia, Pa.

"Indirect-Direct Technic for Gold Onlays and Overlays"
Harry A. Mesjian.....Philadelphia, Pa.

"Technic for Occlusal Restoration in Raising or Opening the Bite"
W. J. Robinson.....Philadelphia, Pa.

Office Efficiency

"Simplified Office Procedures and Time-Saving Devices"
John H. Yearick.....Philadelphia, Pa.

"Extraction of Teeth"
E. E. Hamilton.....Allentown, Pa.

"Orthodontic Aids in the Treatment of Some Deciduous and Mixed Dentition Cases"
L. E. Yerkes.....Allentown, Pa.

"Pinledge Attachments for Anterior Bridgework"
E. G. Gilbert.....Allentown, Pa.

"Simple Gold Inlay Technic"
John Heineken .....Paoli, Pa.

"Lower Posterior Bridgework"
Charles Brookins Walton..Pittsburgh, Pa.

"Indirect Inlays"
A. C. Young.....Pittsburgh, Pa.

"Bacteriology"
J. S. Oartel.....Wilkinsburg, Pa.

"Exodontia" (With films)
C. R. Grissinger.....Pittsburgh, Pa.

"Basic Principles of Conduction Anesthesia"
Reed P. Rose.....Pittsburgh, Pa.

"Exodontia; Local Anesthetic"
L. Wallace Ohl.....Pittsburgh, Pa.

"Exodontia"
Herman Meyers .....Pittsburgh, Pa.

"Exodontia"
R. J. Englert.....Pittsburgh, Pa.

"Prosthesis"
M. A. Komara.....Pittsburgh, Pa.

"Individual Balanced Occlusion"
Charles A. Reith.....Pittsburgh, Pa.

"Moulages"
Martin Snyderman.....Pittsburgh, Pa.

"Oral Surgery"
Norman Ochsenhirt .....Pittsburgh, Pa.
A. S. Lawson.....Pittsburgh, Pa.

"Roentgen Rays"
J. C. Eselman.....Pittsburgh, Pa.

"Surgery and Immediate Denture Service"
C. Stanley Holmes.....Harrisburg, Pa.

"Local Anesthesia"
B. D. Stein.....Lancaster, Pa.

Pittsburgh Academy of Dentistry

"Plastic and Oral Surgery as You Find It"
S. Glen Major.....Pittsburgh, Pa.

"Replacing of Lower Anterior Teeth by Means of Pinlay Abutments Without Destroying Tooth Structure or Showing Gold"
Jesse A. Pennington, Sr...Pittsburgh, Pa.

"Direct Gold Inlay Impression Technic and Investing"
George T. Gregg.....Pittsburgh, Pa.

"Indirect Three-Quarter Crown Technic and Investing"
Henry B. Anderson.....Pittsburgh, Pa.

"Dry Socket and Postoperative Pain Control"
A. C. Barclay.....Pittsburgh, Pa.

"Fixed and Removable Bridgework"
S. B. Ralston.....Pittsburgh, Pa.
H. T. Patton.....Pittsburgh, Pa.

"Oddities in the Roentgen Rays"
Ford H. Hayes.....Butler, Pa.

"Local Anesthesia"
Charles A. Bogart.....Chester, Pa.

"General Anesthesia"
Joseph T. Chermol.....Chester, Pa.

"Dentures"
J. H. Crist.....Chester, Pa.

"Low Fusing Porcelain"
L. F. Graves.....Ardmore, Pa.

"Partial Denture Technic"
H. F. McDuffee.....Narberth, Pa.

"Zinc Oxide Rebasing"
Charles L. R. Myers.....Chester, Pa.

"Temporomandibular Relations; Rebasing Dentures"
J. H. Smith.....Drexel Hill, Pa.

"Immediate Denture Construction"
Leonard S. Fletcher..Castle Shannon, Pa.

"Dental Care for Patients Having Carcinoma of the Mouth"
Leo Shonfield .....Pittsburgh, Pa.

"Various Mechanical Aids in Daily Practice"
H. Lee Scott.....Wayne, Pa.

"Removal of Small Root Ends"
DeWitt Hall .....Pittsburgh, Pa.

FOURTH DISTRICT

"Occusal Trauma as an Etiological Factor in Periodontal Disease"
J. L. Brause.....Jersey City, N. J.

"Modern Trends in Oral Diagnosis"
Edmond F. de Monseigle.....
.....Asbury Park, N. J.

"Electroplating in Dentistry; Application to Inlay Dies"
Arthur R. Caldwell....Hackensack, N. J.

"Indications for Surgery in Denture Construction"
Charles M. Peters.....Jersey City, N. J.

"Preventive Orthodontia"
L. C. Fairbank.....Washington, D. C.

"Bridge Abutments"
S. Dewey Gottlieb....Washington, D. C.
S. Michael George....Washington, D. C.

"Physiology of Anesthesia (Nitrous Oxide-Oxygen) and Its Application in General Practice"
Herman Braun .....Irvington, N. J.

"Use of Visual Education in the Promotion of Dentistry for Children"
Stuart D. Forrest....West Orange, N. J.

"Children's Dentistry" (Record forms for children's dental service program)
New Jersey Society for the Promotion of Dentistry for Children
Jacob M. Wisan.....Elizabeth, N. J.
Frank L. Pita.....Roselle, N. J.
Frank M. Shapiro.....Bridgeton, N. J.
Aaron L. Ackerman.....Elizabeth, N. J.

"Appliance Used in Class II, Division 1, Cases for Obtaining Distal Movement of the Upper Molars"
Gerard A. Devlin.....Newark, N. J.

"Analgesia (Nitrous Oxide in Dentistry)"
Albin W. Rauch.....Newark, N. J.

"Extraction of Teeth and Oral Surgery of Interest to the General Practitioner"
Maurice J. Lane.....Paterson, N. J.

"Time-Saving Method in Making an Anatomic Full Cast Crown"
C. W. Parsons.....Englewood, N. J.

"Drugs and Their Uses"
William E. Van Erde.....Linden, N. J.

"Bite-Raising"
George Straussberg .....Newark, N. J.

"Simplified Microscopic and Oral Diagnosis of Vincent's Infection"
Allen K. Brouwer.....Toms River, N. J.

"The Insertion of Anatomic Amalgam Restorations"
Francis P. Motzenbecker.....East Orange, N. J.

"Modern Amalgam Technic"
Murray Elters .....Rutherford, N. J.
Samuel Mamlet .....Passaic, N. J.

"Anterior Bridge Abutment"
Jacob Schaffer .....Newark, N. J.

"Silver-Amalgam Restorations: Cavity Preparation, Insertion, Finishing"
William G. Clark.....Newark, N. J.

"Practice Administration and Office Management"
Lawrence E. Kocher..South Orange, N. J.

"Pulp-Canal Therapy"
J. A. Englander.....Jersey City, N. J.

"Bite-Raising with Restorations Selected for Individual Cases"
Leon H. Fradkin.....Montclair, N. J.

"Electrosurgery: Preparation of the Mouth for Denture by Means of Surgical Diathermy"
Elmer H. Brown.....Trenton, N. J.

"All Phases of Operative Dentistry, Including Gold Foil"
Herbert Ely Williams....Red Bank, N. J.

"Paralleling Orthodontic Attachments"
Charles A. Spahn.....Newark, N. J.

"Exodontia and Oral Surgery" (Motion pictures in natural color)
Harry J. Field.....Newark, N. J.
Alfred A. Ackerman.....Newark, N. J.

"Interesting Oral Surgery Cases" (Lantern slides)
Maxwell J. Lentz.....Passaic, N. J.

"Predetermination of Success with Denture Patients"
L. Thomas Asche.....Newark, N. J.

"Nutrition for the General Practitioner"
William I. L. McGonigle..Freehold, N. J.

"Manipulative Characteristics of Amalgam in Relation to Physical Properties"
Joseph M. Esnard.....Jersey City, N. J.

"Simple, Practical, Dependable Method of Making Pinledge Abutments Cast Direct"
Walter A. Schilke.....Englewood, N. J.

"Time Savers and Short Cuts in Dentistry"
Harry A. Paskow.....Elizabeth, N. J.

"Use of Hydrocolloids for Impressions in Partial-Denture Construction"
J. V. Giordano.....Paterson, N. J.

"Chrome-Alloy"
Albert Falk .....Paterson, N. J.

"Lateral Plates, Occlusal Films, Bite-Wings, Anterior Posterior Plates and Molar Films"
Henry W. Mustermann.....Leonia, N. J.

"Simple Surgical Technic for Removal of Broken Roots"
Luther M. Mkitarian.....Camden, N. J.

"Cavity Preparations (Black)"
J. C. Turner.....Somerville, N. J.

"Amalgam"
Hugh F. Fox.....Newark, N. J.

"Lower Denture Impression with Suction"
Louis M. Heckman.....Jamesburg, N. J.

"Amalgam"
Edwin H. Burns.....Ridgewood, N. J.

"Coil Springs"
Richard Lowy .....Newark, N. J.

"Wax Rebasing"
Ernest C. Reock.....Belleville, N. J.
W. T. Atkinson.....Newark, N. J.

"Full Dentures"
Albert A. Harrington.....Newark, N. J.

"Practical Considerations in Roentgenography for Children"
Norman T. Sauer.....Asbury Park, N. J.

"Replantation of Anterior Teeth"
Thomas R. Palmer..Greystone Park, N. J.

"Visual Aids in Children's Dentistry"
P. Conner Hulse.....Palmyra, N. J.

"Advantage of a Platino-Iridium Curved Needle in Conductive Anesthesia"
Jesse S. Myers.....Baltimore, Md.

"Bite-Block Stability and the Tooth Space"
Albert J. Nathanson.....Baltimore, Md.

"Brushing the Lingual Interproximal Spaces"
Elmer E. Hackman.....Baltimore, Md.

"Gold Foil Fillings"
Harry E. Latcham.....Baltimore, Md.

"Differential Diagnosis of Periodontal Lesions"
Harold Goldstein .....Baltimore, Md.

"Various Methods of Eliminating the Pyorrhea Pocket, Including Surgery"
Hugh T. Hicks.....Baltimore, Md.

"Demonstration of a New Developer and Fixer"
Carl H. Oertel.....Baltimore, Md.

"Growth Studies of Fifty Children During Their First Nine Years in School"
Richard H. Stucklen....Wilmington, Del.

THE ATLANTIC CITY SESSION

RADIO PROGRAM

Tuesday, July 13

Station WPG

9:45—10:00 a.m.
"Your Teeth and Your Health"
Howard C. Miller.....Chicago, Ill.

3:00—3:15 p.m.
"The Beginning of Organized Dentistry"
Lon W. Morrey.....Chicago, Ill.

Wednesday, July 14

Station WPG

9:45—10:00 a.m.
"Helping Your Child to Success"
Walter T. McFall....Nashville, Tenn.

3:00—3:15 p.m.
"Immediate Denture Service"
Walter J. Pryor.....Cleveland, Ohio

Thursday, July 15

Station WPG

9:45—10:00 a.m.
"Operative Dentistry and Prevention"
James M. Prime.....Omaha, Nebr.

3:00—3:15 p.m.
"Milestones and Millstones"
Richard C. Leonard....Baltimore, Md.

LUNCHEON CLUB PROGRAM

Tuesday, July 13—12:30 p.m.

Rotary Club of Atlantic City, President Hotel
Walter T. McFall.....Nashville, Tenn.

Wednesday, July 14—12:30 p.m.

Exchange Club of Atlantic City, Senator Hotel
Clark J. Hollister.....Harrisburg, Pa.

Thursday, July 15—12:30 p.m.

Kiwanis Club of Atlantic City, Hackney's Restaurant
J. Ben Robinson.....Baltimore, Md.

WOMEN'S PROGRAM

Monday, July 12

7:00 p.m. to 2:00 a.m. Fun Night on Steel Pier. A night of diversified entertainment in the World's Largest Amusement Center where every imaginable type of popular amusement is to be found. Secure tickets when registering.

Tuesday, July 13

9:30 a.m. First General Meeting of the American Dental Association, in the Ballroom of Convention Hall, in the Auditorium.

1:30 p.m. Women's Golf Tournament. Full particulars can be had at Women's Headquarters in the Ambassador Hotel.

8:30 p.m. Second General Meeting of the American Dental Association, in the Ballroom of Convention Hall, in the Auditorium.

Wednesday, July 14

12:30 p.m. Women's luncheon in Westminster Hall, Chelsea Hotel. Tickets can be procured at Registration Booth, Convention Hall, at Women's Headquarters in the Ambassador Hotel or from members of the Women's Committee.

8:30 p.m. Third General Meeting of the American Dental Association, in the Ballroom of Convention Hall, in the Auditorium.

Thursday, July 15

8:00 p.m. President's Ball, in honor of the retiring President, Leroy M. S. Miner. An attractive and appetizing summer dinner menu has been arranged. A few distinctive acts will provide additional entertainment. Tickets $3 each. Attendance limited to 1,000.

SCIENTIFIC AND HEALTH EXHIBITS

List of Exhibitors as of April 28, 1937

1. American Dental Assistants Association, Lucille Hodge, President, 401 Medical Arts Bldg., Knoxville, Tenn.
2. American Dental Hygienists' Association, Margaret Bailey, President, Temple University Dental School, Philadelphia, Pa.
3. American Dietetic Association, Anna

Boller, President, 185 North Wabash Ave., Chicago, Ill.

4. American Public Health Association, Carl Buck, Field Director, 50 West Fiftieth St., New York City.
5. American Medical Association, 535 North Dearborn St., Chicago, Ill.
6. American Red Cross, Douglas Griesemer, National Headquarters, American Red Cross, Washington, D. C.
7. Edward C. Armbrecht, 77 Twelfth St., Wheeling, W. Va.
8. American Dental Association, Bureau of Public Relations, 212 East Superior St., Chicago, Ill.
9. American Dental Association, Council on Dental Therapeutics, S. M. Gordon, Secretary, Chicago, Ill.
10. E. P. Brady, Board of Education Bldg., 911 Locust St., St. Louis, Mo.
11. Theodor Blum, Section on Oral Surgery, Exodontia and Anesthesia, 101 East Seventy-Ninth St., New York City.
12. Columbia University, School of Dentistry, Isadore Hirschfeld, New York City.
13. Isadore Hirschfeld, Columbia University, New York City. (This exhibit will be in Dr. Hirschfeld's own name and the one above in the name of the school.)
14. W. A. Cotton, New York University, College of Dentistry, New York City.
15. George Wood Clapp, 200 West Forty-Second St., New York City.
16. H. F. Curtis, 36 Blvd. Sultan Hussein, Alexandria, Egypt.
17. W. Clyde Davis, National Bank of Commerce Bldg., Lincoln, Nebr.
18. University of Detroit School of Dentistry, Samuel J. Lewis, Detroit, Mich.
19. Eastman Dental Clinic, Harvey J. Burkhart, Rochester, N. Y.
20. Forsyth Dental Infirmary, Percy R. Howe, The Fenway, Boston, Mass.
21. E. N. Gathercoal, National Formulary, 701 South Wood St., Chicago, Ill.
22. Georgetown University, School of Dentistry, W. N. Cogan, Dean, Washington, D. C.
23. Georgia State Department of Health, Annie Taylor, Atlanta, Ga.
24. William J. Greenfield, 50 Anderson St., Hackensack, N. J.
25. P. Philip Gross, 6740 Torresdale Ave., Philadelphia, Pa.
26. Harvard University, School of Dentistry, Richard L. Hapgood, Boston, Mass.
27. Illinois State Department of Health, Charles F. Deatherage, Springfield, Ill.
28. University of Illinois, College of Dentistry, Frederick B. Noyes, Dean, Chicago, Ill.
29. Indiana State Board of Health, Dental Division, Mary H. Westfall, State House Annex, Indianapolis, Ind.
30. Joseph Landa, New York College of Dentistry, New York City.
31. University of Louisville, School of Dentistry, J. T. O'Rourke, Dean, Louisville, Ky.
32. Chicago College of Dental Surgery, Dental Department of Loyola University, W. H. G. Logan, Dean, 1757 West Harrison St., Chicago, Ill.
33. Meharry Medical College, J. J. Mullowney, President, Nashville, Tenn.
34. Murry & Leonie Guggenheim Dental Clinic, J. O. McCall, 422 East Seventy-Second St., New York City.
35. National Congress of P. T. A., William Bristow, 1201 Sixteenth St., Washington, D. C.
36. New York City Department of Health, Harry Strusser, New York City.
37. New York Institute of Clinical Oral Pathology, Inc., Theodor Blum, 101 East Seventy-Ninth St., New York City.
38. New York University, Allen T. Newman, New York City.
39. New Jersey Council on Mouth Hygiene, J. M. Wisan, 1143 East Jersey St., Elizabeth, N. J.
40. Northwestern University, J. Robert Schumaker, Chicago, Ill.
41. Thomas W. Evans Museum and Dental Institute, School of Dentistry, University of Pennsylvania, C. R. Turner, Philadelphia, Pa.
42. University of Pittsburgh, School of Dentistry, Medical Library Association, Dental Section, Alice M. McCann, Pittsburgh, Pa.
43. Weston A. Price, Dental Research Laboratories, 8926 Euclid Ave., Cleveland, Ohio.
44. New York State Department of Health, E. S. Godfrey, Jr., Albany, N. Y.

45. New York State Institute for Malignant Diseases, Harold A. Solomon, 468 Delaware Ave., Buffalo, N. Y.
46. James M. Prime, 1136 Medical Arts Bldg., Omaha, Nebr.
47. W. M. Reppeto, Medical Arts Bldg., Dallas, Texas.
48. Research Commission, National Bureau of Standards, H. E. Kelsey, Washington, D. C.
49. Joseph E. Schaefer and K. W. Penhale, 55 East Washington St., Chicago, Ill.
50. J. A. Salzmann, Central Commercial High School, 214 East Forty-Second St., New York City.
51. University of Rochester, School of Medicine and Dentistry, H. Jobe Sedwick, 260 Crittenden Blvd., Rochester, N. Y.
52. Temple University Dental School, I. M. Broomell, Philadelphia, Pa.
53. H. W. Titus, 627 Miner Bldg., Eugene, Ore.
54. Tufts College Dental School, Howard M. Marjerison, Boston, Mass.
55. U. S. Public Health Service (Memorial to Dr. Messner), H. Trendley Dean, Washington, D. C.
56. U. S. Children's Bureau, Katharine Lenroot, Washington, D. C.
57. U. S. Indian Service, U. S. Public Health Service, C. W. Wekenman, Washington, D. C.
58. Medical College of Virginia, Harry Bear, Dean, Richmond, Va.
59. George B. Winter, Frisco Bldg., St. Louis, Mo.
60. Wheeling Dental Society and West Virginia Dental Society, E. C. Armbrecht, 77 Twelfth St., Wheeling, W. Va.
61. School of Dental and Oral Surgery, Columbia University, Department of Orthodontia, Sidney E. Riesner, 136 East Thirty-Sixth St., New York City.

ANNOUNCEMENTS

AMERICAN ACADEMY OF RESTORATIVE DENTISTRY

The American Academy of Restorative Dentistry will meet July 10 and 11, in the Rose Room, Traymore Hotel, Atlantic City.

A. F. SCHOPPER, *Secretary,*
Professional Bldg.,
Kansas City, Mo.

AMERICAN ASSOCIATION OF DENTAL EDITORS

The American Association of Dental Editors will hold its annual meeting Saturday, July 10, in the Ambassador Hotel, Atlantic City. It will be an all day meeting and editors are urged to attend.

O. W. BRANDHORST, *Secretary,*
4500 Olive St.,
St. Louis, Mo.

AMERICAN COLLEGE OF DENTISTS

The American College of Dentists will hold its annual convocation, Sunday, July 11, in the Venetian Room, Ambassador Hotel, Atlantic City, with luncheon in the Rainbow Grill. The Fellows of the College are urged to attend.

O. W. BRANDHORST, *Secretary,*
4500 Olive St.,
St. Louis, Mo.

AMERICAN SOCIETY OF ORAL SURGEONS

The Nineteenth Annual Meeting of the American Society of Oral Surgeons and Exodontists will be held in Atlantic City, July 9-10. Headquarters will be at the Hotel Chelsea.

HARRY BEAR, *Secretary,*
410 Professional Bldg.,
Richmond, Va.

AMERICAN SOCIETY FOR THE PROMOTION OF DENTISTRY FOR CHILDREN

The American Society for the Promotion of Dentistry for Children will hold its annual meeting, July 12, an all-day session, beginning at 9 a.m. There will be a noon luncheon at which Katharine Lenroot, chief of the Children's Bureau, will be the main speaker. Reginald M. Atwater, executive secretary of the American Public Health Association, will be the introductory speaker. Headquarters will be at the Hotel Chelsea. The program itself will consist of a series of papers describing the progress made in children's dentistry during the past year. The discussions will include: (1) public health aspects, (2) nutrition, (3) operative procedures and technics, (4) bibliographies and (5) histology and pathology.

JOHN C. BRAUER, *Secretary,*
106 Forrest Ave. N. E.,
Atlanta, Ga.

THE AMERICAN FULL DENTURE SOCIETY

The American Full Denture Society will hold its ninth annual meeting at the Jefferson Hotel in Atlantic City, July 9-10.

H. L. HARRIS, *Secretary,*
Lowry Bldg.,
St. Paul, Minn.

ASSOCIATION OF AMERICAN WOMEN DENTISTS

An invitation is extended to all woman dentists attending the convention to participate in the meeting of the Association of American Women Dentists, Monday, July 12, in the Surf Room of the Ambassador Hotel. There will be a breakfast at 8:30 a.m., followed by a business meeting and a banquet at 6:45 p.m. Details of the afternoon's entertainment will be announced later.

ASSOCIATION OF MILITARY DENTAL SURGEONS OF THE UNITED STATES

The Twenty-Fourth Annual Meeting of the Association of Military Dental Surgeons will be held in the Ambassador Hotel, Atlantic City, Wednesday evening, July 14. There will be a dinner followed by a business meeting. Members and former members are urged to attend.

H. G. OTT, *Secretary,*
Office of Surgeon General,
Washington, D. C.

NATIONAL ASSOCIATION OF DENTAL EXAMINERS

The National Association of Dental Examiners will hold its annual meeting, Saturday and Sunday, July 10-11, in the Surf Room of the Ambassador Hotel, Atlantic City.

R. P. THOMAS, *Secretary,*
Heyburn Bldg.,
Louisville, Ky.

MOUTH HYGIENE LUNCHEON

The Annual Mouth Hygiene Luncheon of the American Dental Association will be held in the Venetian Room of the Ambassador Hotel, Atlantic City, Wednesday, July 14, 12:15 p.m. The Committee on Dental Health Education presents as speaker this year Lon W. Morrey, Chicago.

E. L. PETTIBONE, *Chairman,*
6503 Detroit Ave.,
Cleveland, Ohio.

COMMITTEE ON DENTAL HEALTH EDUCATION

The Committee on Dental Health Education invites all mouth hygiene workers and state directors of dental health education to attend the annual conference breakfast at 8 a.m., Wednesday, July 14, Room 104, Ambassador Hotel, Atlantic City.

E. L. PETTIBONE, *Chairman,*
6503 Detroit Ave.,
Cleveland, Ohio.

AMERICAN DENTAL HYGIENISTS' ASSOCIATION

The American Dental Hygienists' Association will meet July 12-16, in Atlantic City. Headquarters will be in the Dennis Hotel. All members of the American Dental Association are invited to attend all meetings.

DAISY M. BELL, *Secretary.*

AMERICAN DENTAL ASSISTANTS ASSOCIATION

The Thirteenth Annual Meeting of the American Dental Assistants Association will be held in Atlantic City, July 12-16. Headquarters will be at the Chalfonte-Haddon Hall.

LUCILE S. HODGE, *General Secretary,*
401 Medical Arts Bldg.,
Knoxville, Tenn.

PAST PRESIDENTS' (A. D. A.) CLUB LUNCHEON

The Past Presidents' Club of the American Dental Association will hold its annual luncheon at 12:30 p.m., Tuesday, July 13, in Room 116 of the Ambassador Hotel. The annual address will be delivered by John P. Buckley, Hollywood, Calif.

Every Past President in attendance at the meeting is urgently requested to be present at this luncheon.

HOMER C. BROWN, *Secretary,*
Columbus, Ohio.

HOUSE OF DELEGATES LUNCHEON

The New Jersey State Dental Society will be hosts to the Delegates, Trustees and Officers of the American Dental Association at a luncheon in the Venetian. Room of the Ambassador Hotel, Atlantic City, Monday, July 12, at 12:30 p.m. Invitations will be given out on registration.

AMERICAN SOCIETY FOR THE ADVANCEMENT OF ORAL DIAGNOSIS

The annual meeting of the American So-

ciety for the Advancement of Oral Diagnosis will be held July 12, with headquarters at the Ritz-Carlton Hotel.

NATIONAL SOCIETY OF DENTURE PROSTHETISTS

The annual meeting of the National Society of Denture Prosthetists will be held July 5-9, with headquarters at the Madison Hotel.

AMERICAN ACADEMY OF PERIODONTOLOGY

Annual meeting of the American Academy of Periodontology will be held July 8-10, with headquarters at the Claridge Hotel.

DELTA SIGMA DELTA FRATERNITY

The Fifty-Third Annual Meeting of the Supreme Chapter of Delta Sigma Delta Fraternity will be held in the Marlborough-Blenheim Hotel, Atlantic City, July 12. The first session will be held at 9:30 a.m., and will be followed by the usual complimentary luncheon to members. At the afternoon session, Supreme Chapter initiatory exercises will be exemplified by a selected team from an auxiliary chapter. The annual banquet, to which women are invited, will take place at 6:30 p.m. In registering for the banquet, it will be necessary to present membership cards to the committee in charge. Hotel reservations should be made as soon as possible, and any inquiries may be sent to the office of the Supreme Scribe, R. Hamill D. Swing, Elrae Building, Locust and Fifteenth Sts., Philadelphia, or directly to the Marlborough-Blenheim Hotel.

By Order of the Supreme Council.

FREDERIC R. HENSHAW,
Supreme Grand Master.

SIGMA EPSILON DELTA FRATERNITY

The Sigma Epsilon Delta Fraternity will meet July 12. Headquarters will be at the Knickerbocker Hotel.

PHILADELPHIA DENTAL COLLEGE

The members of the class of 1907 of the Philadelphia Dental College will hold their thirtieth reunion in Atlantic City the week of the Annual Session of the American Dental Association, July 12-16.

C. W. VIVIAN,
58 Elbridge Road,
New Britain, Conn.

COMMITTEE ON ECONOMICS

The Committee on Economics will meet Sunday, July 11, at 9 a.m., Room 122, Ambassador Hotel, Atlantic City. All members and deputies of the committee are urged to be present and to present their reports at that time.

LON W. MORREY, *Secretary,*
212 East Superior St.,
Chicago, Ill.

A. D. A. MEMBERSHIP COMMITTEE

The A. D. A. Membership Committee will meet on Tuesday, July 13, at 3 p.m., Ambassador Hotel, Room 166.

PAUL W. ZILLMAN, *Chairman,*
29 Walden Ave.,
Buffalo, N. Y.

INTERNATIONAL COLLEGE OF DENTISTS

The International College of Dentists will meet July 11, with headquarters at the Chelsea Hotel, Atlantic City.

AMERICAN DENTAL GOLF ASSOCIATION

The American Dental Golf Association will meet in Atlantic City, July 11-16. The Calcutta Pool dinner will be held Sunday, July 11, and the prize winners' dinner, Tuesday, July 13, at the Ambassador Hotel at 7 p.m. The tournament will be played Monday, July 12, as follows:

Class A at the Seaview Golf Club.
Class B at the Northfield Country Club.
Class C at the Linwood Country Club.

E. RAY BROWNSON,
Secretary.

AMERICAN DENTAL TRAP SHOOTERS' LEAGUE

The registration of members of the American Dental Trap Shooters' League will be held on the lobby floor, Ambassador Hotel, Atlantic City, July 11-12. The shoot will take place July 12 at 1:30 p.m.

DR. GIES TO BE HONORED

A testimonial dinner will be tendered Dr. William J. Gies, at Atlantic City, Sunday evening, July 11, in recognition of his interest and devotion to the dental profession and his tireless efforts in its behalf.

The American College of Dentists, American Dental Association, Canadian Dental Association, Dental Section of the American Association for the Advancement of Science, International Association for Dental Research, American Association of Dental Schools, Na-

tional Association of Dental Examiners, American Association of Dental Editors, Omicron Kappa Upsilon and many other organizations will join in paying tribute to Dr. Gies on this occasion.

The dinner will take place in the Chelsea Hotel in conjunction with the evening session of the American College of Dentists, which will be an open meeting to which all ethical dentists are invited. Dress is informal; ladies are invited, and the dinner is $3 a plate. Reservations should be made through

O. W. BRANDHORST, *Secretary,*
American College of Dentists,
223 Lister Bldg.,
St. Louis, Mo.

PSI OMEGA FRATERNITY

Psi Omega headquarters during the meeting of the American Dental Association in Atlantic City, July 12-16, will be at the Traymore Hotel, on the Boardwalk. All visiting members are requested to register at headquarters in this hotel on arrival. The annual banquet of the National Alumni Chapter will be held at the Traymore Hotel, Monday, July 12, at 6:30 p.m. All Psi Omegas and women guests are invited to be present. The executive meeting of the National Alumni Chapter will be held in the headquarters room at the hotel Tuesday morning, July 13.

HAROLD H. HAYES, *Grand Master,*
6760 Stony Island Ave.,
Chicago, Ill.

ALPHA OMEGA FRATERNITY

Headquarters for the Alpha Omega Fraternity will be maintained at the Ritz-Carlton Hotel during the Annual Session of the American Dental Association to be held in Atlantic City, July 12-16. All fraters are urged to register at official headquarters, and are invited to attend the formal dinner at the Ritz-Carlton Hotel on the evening of July 12.

By Order of the Supreme Chancellor.
ALVIN H. BERMAN,
Supreme Scribe.

XI PSI PHI FRATERNITY

The Xi Psi Phi Fraternity will hold its annual banquet Monday, July 12, at the Shelburne Hotel, at 6:30 p.m. All members of the Fraternity are invited to be present.

GEORGE A. COLEMAN,
Supreme President,
Fifteenth and Locust Sts.,
Philadelphia, Pa.

RAILROAD FARES TO ATLANTIC CITY

Because of the reduced regular rates and round-trip fares, there is no longer any arrangement for convention rates and, therefore, there will be no convention certificates available as in the past. The new low rates for passage in pullmans and the lower rates for travel in coaches will be in force. Summer excursion rates will be available from some sections of the country. Inquire of your station agent as to the most economical fare.

AMERICAN DENTAL ASSOCIATION

Atlantic City, New Jersey — July 12-16, 1937

HOTEL RESERVATIONS

To secure hotel accommodations for the 1937 Session, consult the rate list and fill out the blank below. Mail this immediately to the hotel of your first choice or to the Housing Committee, Room 120, Hotel Ambassador, Atlantic City, N. J. Confirmation will be sent to you by the hotel.

Second and third choices of hotel should be indicated. If the reservation cannot be made at any of the hotels of your choice, the Housing Committee will place you in as favorable a hotel as possible and will notify you.

Please remember that a reservation constitutes a contract with the hotel to provide you with the accommodations you desire. If you find it impossible to carry out your part of the contract, namely, to occupy the room at the time agreed on, please write or wire the hotel releasing the room, in order that it may be available for other members.

APPLICATION FOR HOTEL ACCOMMODATIONS

AMERICAN DENTAL ASSOCIATION
Atlantic City, N. J. July 12-16, 1937

HOTEL.....1st Choice

HOTEL.....2nd Choice

HOTEL.....3rd Choice

Kindly reserve the following:

.....Rooms with Bath for.....persons $.....per Room

.....Rooms without Bath for.....persons $.....per Room

Arriving on July.....at.....A. M.....P. M.

ROOMS TO BE OCCUPIED BY:

NAME	ADDRESS IN FULL
.....	.....
.....	.....
.....	.....

NOTE TO HOTEL NAMED AS FIRST CHOICE: If the hotel of first choice is unable to make the reservation requested, this application should be forwarded at once to the Housing Committee, Room 120, Ambassador Hotel, Atlantic City, N. J.

HOTELS	WITH BATH*		Additional Charge for Each Person for Three Meals
	One Person	Two Persons	
BOARDWALK HOTELS			
AMBASSADOR	$3.00–4.00–5.00–6.00	$6.00–7.00–8.00–10.00	$4.00
BRIGHTON	3.00–4.00–5.00	5.00–6.00–7.00–8.00	3.50
CHALFONTE-HADDON HALL	3.00–4.00–6.00–8.00	6.00–8.00–10.00–12.00	3.50
CHELSEA	3.00–4.00–5.00	5.00–6.00–7.00–8.00	3.00
CLARIDGE	4.00–5.00–6.00	6.00–7.00–8.00–11.00	4.00
DENNIS	3.50–4.00–5.00–6.00	6.00–7.00–8.00–9.00–10.00	3.00
KNICKERBOCKER	3.00–3.50–4.00	5.00–6.00–7.00–8.00–9.00	3.00
MARLBOROUGH-BLENHEIM	4.00–5.00–6.00	6.00–7.00–8.00–10.00–11.00	3.00
NEW BELMONT	2.50–3.00	4.00–5.00–6.00–8.00	†
RITZ-CARLTON	4.00–5.00	6.00–7.00–8.00	3.00
STRAND	3.50	6.00–7.00–9.00	3.00
SEASIDE		6.00–7.00–8.00	3.00
SHELBURNE	4.00–5.00	6.00–7.00–8.00	†
TRAYMORE	3.50–4.00–5.00	6.00–7.00–8.00	3.00
AVENUE HOTELS			
ARLINGTON		9.00—American plan only	2.00
COLTON MANOR	3.00–3.50–4.00	5.00–6.00–7.00	2.00
FLANDERS	2.50–3.00–4.00	4.00–5.00–6.00	2.00
FRANKLIN INN	3.00	4.00–5.00	2.00
GLASLYN-CHATHAM	Rooms with running water only		2.00
JEFFERSON	3.00–3.50	5.00–5.50–6.00	2.50
KENTUCKY	Rooms with running water only		†
LAFAYETTE	3.00–3.50–4.00	5.00–6.00–7.00	2.00
MADISON	3.00–3.50–4.00	5.00–6.00–7.00	2.50
MONTICELLO	Rooms with running water only		2.00
MORTON	4.50	7.00	2.50
PRINCESS	4.00	5.50–7.00	2.00
SENATOR		7.00	2.50
STERLING		5.00	2.00
THURBER	Rooms with running water only		†

*Rates on single and double rooms with running water available on request.
†European plan only.

Calling All Dentists! — To Atlantic City

American Dental Association Meeting July 12-16, 1937

THE rolling waves of the Atlantic Ocean, beating a rhythmic song on the sandy shore of Atlantic City, seem to be saying "Calling all dentists to meet here, July 12th to 16th, to join in the great gathering of the seventy-ninth session of the American Dental Association.

Without doubt, one of the biggest, most interesting and important meetings of the national organization is about to be consummated in this year's session. The section and committee chairmen have been working for months to complete plans for unusually interesting and advanced programs. Their work is about complete and, from preliminary reports, there seems to be nothing left for our imagination or desire in the way of scientific discussions, exhibits, clinics and demonstrations. If you are interested in dentistry, any branch of dentistry, you will not want to miss this year's big dental exposition in New Jersey.

The Local Arrangements Committee has the stage all set to house both the record-breaking attendance and the "hundred-ring dental show." The great Convention Hall will echo "Preventive Dentistry in the Interest of Health," and the many exhibits, section meetings and clinics will be so orderly arranged in the spacious hall that every one can be assured of enjoying his favorite attractions in comfort and convenience.

While your mission to the Jersey shore will be mainly in search of scientific and professional advancement, you may also plan to enjoy a most sociable, pleasing vacation.

A perfectly balanced program of scientific and entertaining events has been arranged. On the scientific side, we shall have a great array of the most prominent essayists, over one hundred and fifty clinics, a very large display of scientific and health exhibits and a formidable commercial exhibit. On the entertainment side, we shall have the unsurpassed Atlantic Ocean bathing, fishing and boating, the boardwalk and its many interesting and attractive features, the sunny broad beach, golf and sports, and the many beautiful side trips and sightseeing trips in the nearby country. To complete the program, we shall have our own fraternity and section meetings and banquets and the grand finale—the ultimate in sociability and entertainment—the President's ball, on Thursday night, in honor of Dr. Leroy M. S. Miner.

The famous Atlantic City hostelries, all conveniently located to the big Convention Hall, are being deluged with reservations. Great though the accommodations are, you will want to get your reservation in early, to be assured of the best location available in one of the hotels of your choice.

Don't wait! Write *now* for your reservation. Postmortems will not bring back the opportunity to attend this Atlantic City meeting. Make up your mind *now*, that you will be among those present at this session to expound

"Preventive Dentistry in the Interest of Health."

LOCAL ARRANGEMENTS COMMITTEE,
W. A. WILSON,
Chairman of Publicity.

COMMERCIAL EXHIBITS

Abbott Laboratories, North Chicago, Ill.
Ackerman Dental Mfg. Co., Santa Monica, Calif.
Aderer, Inc., Julius, New York City.
Adler Engineering Co., Hackettstown, N. J.
Allison Co., W. D., Indianapolis, Ind.
American Cabinet Co., Two Rivers, Wis.
American Safety Razor Corp., Brooklyn, N. Y.
American Hecolite Denture Corp., Portland, Ore.
Ames Co., W. V-B., Fremont, Ohio.
Antidolor Mfg. Co., Inc., New York City.
Anzell Specialty Co., Brooklyn, N. Y.
Ash Sons & Co., Claudius, Irvington, N. J.
Atlantic Rubber Mfg. Co., New York City.
Austenal Laboratories, Inc., Chicago, Ill.

Bakelite Dental Products, Inc., New York City.
Baker & Co., Inc., Newark, N. J.
Bard-Parker Co., Inc., Danbury, Conn.
Boos Dental Laboratories, Henry P., Minneapolis, Minn.
Bosworth Co., Harry J., Chicago, Ill.
Buffalo Dental Mfg. Co., Buffalo, N. Y.
Bunch Co., Ray, Los Angeles, Calif.
Burton Mfg. Co., Inc., Chicago, Ill.
Butler Co., John O., Chicago, Ill.

Carborundum Co., Niagara Falls, N. Y.
Castle Co., Wilmot, Rochester, N. Y.
Caulk Co., L. D., Milford, Del.
Chicago X-Ray Film & Mount Co., Chicago, Ill.
Church & Dwight Co., Inc., New York City.
Cleveland Dental Mfg. Co., Cleveland, Ohio.
Climax Dental Laboratory, Philadelphia, Pa.
Coe Laboratories, Inc., Chicago, Ill.
Columbia Dental & X-Ray Corp., New York City.
Columbus Dental Mfg. Co., Columbus, Ohio.
Comfort Mfg. Co., Chicago, Ill.
Condit, P. N., Boston, Mass.
Consolidated Car-Heating Co., Inc., Albany, N. Y.
Cook Laboratories, Inc., New York City.
Corega Chemical Co., Inc., Cleveland, Ohio.
Crescent Dental Mfg. Co., Chicago, Ill.

Dee & Co., Thomas J., Chicago, Ill.
Dentists' Supply Co. of New York, New York City.
Dent-Kraft Laboratories, Inc., Newark, N. J.
Detroit Dental Mfg. Co., Detroit, Mich.
Dudley Research Corp., New York City.

Eastman Kodak Co., Rochester, N. Y.

Fara Mfg. Co., Chicago, Ill.
Fischer & Co., H., Inc., New York City.
Fischer & Co., H. G., Inc., Chicago, Ill.
Fleer Corp., Frank H., Philadelphia, Pa.
Friedman Specialty Co., Chicago, Ill.

General Electric X-Ray Corp., Chicago, Ill.
Goldsmith Brothers Smelting & Refining Co., Chicago, Ill.

Hanau Engineering Co., Inc., Buffalo, N. Y.
Handler, Edward, & Son, Newark, N. J.
Hanovia Chemical Mfg. Co., Newark, N. J.
Heidbrink Co., Minneapolis, Minn.
Horlick's Malted Milk Corp., Racine, Wis.
Hu-Friedy Mfg. Co., Chicago, Ill.

Ideal Tooth, Inc., Cambridge, Mass.
Iteco Co., Portland, Ore.
Ivory, J. W., Philadelphia, Pa.

Jelenko & Co., J. F., Inc., New York City.
Johnson & Johnson, New Brunswick, N. J.
Justi & Son, H. D., Inc., Philadelphia, Pa.

Kromel Laboratories, New York City.

Lactona, Inc., St. Paul, Minn.
Lea and Febiger, Philadelphia, Pa.
Lochhead Laboratories, Inc., New York City.

Mann Laboratories, Bradley Beach, N. J.
Martin Rubber Co., Inc., Long Branch, N. J.
Masel Dental Laboratory, Philadelphia, Pa.
Mattern Co., F., Chicago, Ill.
McCaskey Register Co., Alliance, Ohio.
McCormick Rubber Co., Inc., E. J., Passaic, N. J.
McKesson Appliance Co., Toledo, Ohio.
Medical Protective Co., Wheaton, Ill.
Merck & Co. Inc., Rahway, N. J.
Minimax Co., Chicago, Ill.
Mizzy, Inc., New York City.
Morris & Co., Philip, Ltd., Inc., New York City.
Mosby Co., C. V., St. Louis, Mo.
Moyer Co., J. Bird, Inc., Philadelphia, Pa.

Ney Co., J. M., Hartford, Conn.
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CURRENT LITERATURE

Human Bites

By E. P. Dunn

Wounds following human bites tend to spread diffusely as phlegmonous processes, discharge foul pus, yield slowly to treatment and may result in deformities of amputation. The nature of the wound, virulence of the organism introduced and anatomical relations of the areas involved are the adverse factors. The penetrating, punctate wounds usually show much tissue destruction.

The infection is usually of a mixed kind with the common mouth organisms, including staphylococci, streptococci, fusiformis and spirochetes. About 80 per cent of the injuries are on the hands and fingers in areas where infection is likely to spread. Electrocauterization or cauterization with fuming nitric acid has been found highly successful, whereas ordinary surgical treatment is usually unsatisfactory. The author uses fuming nitric acid for cauterizing all bites and, in those cases where infection is already present, adequate incision. A warm moist dressing, followed by irrigation with potassium permanganate, 1:1000; hydrogen peroxide or other oxidizing agent is used after incision.—*Am. J. Surg.*, 46:44, April 1937.

Hamilton Robinson.

Dental Morphology and Pathology of Pre-Spanish Peru

By R. Wood Leigh

This study is based on the examination of about 900 skulls of the skeletal collection from Peru in the Museum of Anthropology of the University of California, Berkeley. The dietary habits, a narcotic habit, the morphology and pathological changes seen in the skulls of the Incas of that period are discussed. In addition, under morphology, the following are considered: cranial types, the mandible, gnathic index, dental index, the occlusion and the teeth. Under pathology, the following are observed: attrition, dental caries, periapical osteitis, radicular cyst, chronic maxillary sinusitis, effects of coca-lime chewing on the teeth, periodontoclasia, exfoliation, senility, surgery, restorative dentistry and ethnic deformation. Data is given to emphasize one or two points, but no lengthy tables or illustrations are included.—*Am. J. Phys. Anthropol.*, 22:267, January-March 1937.

Grant Van Huysen.

Temporomandibular Joint Malocclusion and the Inner Ear, A Neuromuscular Explanation

By E. P. Seaver, Jr.

While the diagnosis of temporomandibular joint malocclusion is simple, the difficulty is to evaluate its importance as a factor in ear disturbances. Trial bite opening affords good evidence. Loss of proper position of the condyle in the glenoid fossa results in neuromuscular disturbances in the muscles of mastication and reflexly involves the related neuromuscular mechanism of the inner ear. The resultant effect will vary with the stage of irritation. The whole "symptom-complex will be associated with other local and systemic factors and the whole picture will vary with the individual behavior."—*Ann. Otol., Rhin. and Laryng.*, 46:140, March 1937.

Hamilton Robinson.

Temporomandibular Joint: Dental Aspect

By E. Greene

The proper relationship of the temporomandibular joint depends upon the proper occlusion of the teeth. In many people the joint is functioning under abnormal tension. Deafness, vertigo, tinnitus and neuralgia react to repositioning of the mandible. Several theories have been advanced to explain

the relationship to ear disturbances, including direct encroachment of the head of the condyle upon the external auditory canal, constriction of the eustachian tubes and impaction of the auriculotemporal and chorda tympani nerves. The author feels that a more vital factor must be involved, and advances the hypothesis that proprioceptor nerve impulses transcending the normal threshold and communicating with the central nervous system cause the disturbances. Mouths likely to cause reflex disturbances are (1) those with loss of much tooth surface from excessive wear, with the teeth firmly fixed, (2) those with normal contact in the molar region lost through caries, attrition or extraction, (3) those in which restorations do not restore masticating equilibrium and (4) edentulous cases. Temporary adjustable splints can be used to quickly reestablish normal relationships and, if conditions are improved, permanent restorations can be constructed. Two case histories are cited.—*Ann. Otol., Rhin. and Laryng.*, 46:148, March 1937.

HAMILTON ROBINSON.

The Selenium Problem in Relation to Public Health

By MAURICE I. SMITH, K. W. FRANKE and B. B. WESTFALL

SINCE about 1856, an affliction known as "alkali disease" has been observed in horses, cattle and hogs of several of the north-central states, particularly S. Dakota, Wyoming and Nebraska. This has been recently associated with the high incidence of selenium found in shale soils.

One hundred and eleven families were selected for study from regions which had either active cases of the disease in animals or a history of it. Physical examinations were made on ninety families out of the one hundred and eleven. Urine analysis of these showed 92 per cent contained selenium in varying amounts up to 133 micrograms per 100 cc. This corresponded in some degree with the tests on horses having the disease, which showed amounts from 33 to 170 micrograms per 100 cc. Although no serious illness was observed that resembled selenium poisoning, many of the subjects gave vague symptoms of ill health. Anorexia, indigestion, general pallor and malnutrition were common observations. Bad teeth were noted, varying from marked discoloration to decay. Icterus, various types of skin eruptions, chronic arthritis, rheumatoid symptoms and changes in the nails of fingers and toes were noted in a high percentage of the individuals.

No definite correlation was evident between symptoms of disease and amount of selenium found in urine, but the authors hold this to be of little significance, concluding that small amounts ingested over long periods of time may be more harmful than infrequent large amounts.—*Public Health Reports*, 51:1496, October 30, 1936.

VIRGIL D. CHEYNE.

Effects of Dissimilar Metals in Tooth Fillings

To the Editor:—A source of endless inquiry by patients concerns effects of dissimilar metals in teeth. To me it seems mostly nonsense. Please give the public and me a chance to meet this kind of inquiry authentically.

ANSWER:—It has long been suspected that dissimilar metals in the mouth in the presence of an electrolyte, such as saliva, result in the generation of small electric currents, which probably constitute a source of irritation to the oral mucous membranes. Recent observations, both clinical and experimental, tend to confirm this view. It has been noted that localized patches of leukoplakia have formed exactly opposite two teeth containing fillings of dissimilar metals. Actual changes in electrical potential have also been observed in such patients by fine measurements. Clinical and experimental evidence, therefore, combine to cast suspicion on the presence of dissimilar metals in the mouth in relation to oral cancer. If further studies prove this to be correct, it will be established that this is only one more form of irritation. Much more research will be required to confirm these observations and to determine the precise rôle of this factor to the genesis of precancerous and cancerous lesions of the

mouth.—Comment from Queries and Minor Notes, *J.A.M.A.*, 108:996, March 20, 1937.

M. K. HINE.

Furuncle of Upper Lip

By G. H. PRATT

FAILURE to find a particularly invasive organism led investigators to realize that ordinary infections may take a different, and often fatal, course in the upper lip region. Facial planes, as a rule, limit and guide the course of an infection, but here the muscles have no fascia and the skin is closely attached to them. There is no facial area limiting spread, and the movement of the skin on the muscles beneath pumps septic material into the surrounding tissue spaces. Another anatomical consideration is that the angular vein, a branch of the facial, anastomoses with the superior ophthalmic, which is a main tributary of the cavernous sinus. None of these veins has the protective mechanism of valves, and the thrombosis progresses to the cavernous sinus, a structure which is constructed in a manner conducive of thrombosis. Most infections of the upper lip should be treated with respect, as maltreatment or overtreatment may lead to grave results. The author outlines conservative treatment for pimples and furuncles, for their complication stages and for cavernous sinus thrombosis.—*Am. J. Surg.*, 46:118, April 1937.

HAMILTON ROBINSON.

Fractures of Mandible and Maxilla

By F. S. DUNN

THE goal of reduction is the reëstablishment of the normal relationship of the teeth in the upper and lower jaws. Practically all fractures of the jaws are compound. Wiring is the most practical method for reduction and immobilization. Although the general condition of the patient may warrant some delay, wiring should be instituted as promptly as possible. General anesthetics are rarely used because of the danger of postoperative vomiting. Teeth in the line of fracture, with few exceptions, should be removed. Eighteen-gage silver band wire is adapted to the outside of the teeth and fastened to each tooth with 22-gage brass wires. Twenty-six-gage brass wire is used to connect the band wires which hold the upper and lower jaws together. Soft tissues should be adequately cared for and drainage of wounds afforded. Fractures across the ramus may be more complicated because of the upward pull of the masseter and temporal muscles. In edentulous cases head bandages are used. Inasmuch as immobilization is a serious strain on the teeth and supporting structures, the strain should be distributed over as many teeth as possible.—*Am. J. Surg.*, 46:83, April 1937.

HAMILTON ROBINSON.

Vinyl Ether Anesthesia

By E. W. BEACH

THE author reports results of 2,630 cases with vinyl ether. The advantages are rapid induction and recovery, with no irritation of the air passages and few after-effects. It is particularly suitable for minor surgery in ambulant cases, and especially for the extraction of children's teeth. It may be used with advantage wherever a deep anesthesia of short duration is required, but its great volatility and rapidity make long anesthesia difficult. The possibility of toxic effects upon the liver must be considered.—*Curr. Res. Anesth. and Analg.*, 15:214, September-October 1936.

J. FRANK HALL.

Oral and Pharyngeal Manifestations of Dermatologic Conditions

By H. MONTGOMERY

THE author only mentions the common conditions such as syphilis, tuberculosis, leukoplakia, neoplasms, the exanthemata, Vincent's infection and canker sores. Other conditions seen in the oral cavity, including blastomycosis, coccidioidal granulomata, torulosis, sporotrichosis, actinomycosis, tularemia, xanthoma, lymphoblastoma, fungi, perlèche, thrush, acrodynia, allergies, erythema multiforme, pemphigus and anemias, are described in more or less detail as regard their oral manifestations.—*Ann. Otol., Rhin. and Laryng.*, 46:179, March 1937.

HAMILTON ROBINSON.

INCIDENTS OF PRACTICE

Use of Potassium Chloride as a Hemostatic Agent: Report of Two Cases

By JOHN A. HIGGINS, D.D.S.
Chicago, Ill.

McGuigan, Camp and Higgins[1] have demonstrated experimentally the similarity of action between epinephrine (adrenalin) and some potassium salts. This experimentation was suggestive of the possible use of potassium salts as hemostatic agents in clinical practice. Accordingly, a 5 per cent solution of potassium chloride was made up and held in readiness for cases showing a prolonged bleeding time.

The following cases are typical of the results so far obtained.

REPORT OF CASES

Case 1.—J. D., a boy, aged about 19, came in shortly before 8 a.m. with the complaint that he had been troubled with a toothache all night. The lower right first molar tooth was removed at 8:15 a.m. and the patient left shortly thereafter for his place of employment.

About 4:30 p.m. of the same day, he returned to the dental office complaining that he had lost much blood during the day and that there was still bleeding from the tooth socket. On examination, a blood clot was revealed extending from the cuspid tooth to the posterior part of the lower right ridge. The blood clot was dark and bright, arterial blood was noted to be coming from the tooth socket.

The blood clot was removed and the tooth socket made relatively clean with the aid of small cotton balls. A similar ball that would fill the socket was now saturated with the 5 per cent potassium chloride solution and packed gently but firmly in the socket. The patient was instructed to leave the packing as it was, but prior to eating the evening meal (about 5:30 p.m.) to rinse the mouth with a small amount of tap water. At 7:15 p.m., by appointment, I removed the cotton ball from the socket. Bleeding had ceased and the patient was dismissed with instructions to return if the bleeding reappeared.

Case 2.—A. C., a high school boy, came to the dental office at approximately 1:15 p.m. for the removal of badly decayed upper right and left first molar teeth. The teeth were extracted, and the patient rinsed his mouth with a little tap water of room temperature and left the office. At approximately 5:15 p.m., he returned complaining that much blood was still coming from the area where the teeth had been removed.

On examination, blood clots were observed in the tooth sockets, yet bright arterial blood was coming from both sockets. On inquiry, the patient stated that he had previously experienced much difficulty in stopping a hemorrhage of the nose.

The blood clots were removed from both sockets and small balls of cotton saturated with 5 per cent potassium chloride solution were inserted gently but firmly. The patient was instructed to rinse the mouth only prior to eating the evening meal and was given an appointment for 7 p.m. of the same day. At 6:45 p.m., he returned. As the bleeding had stopped, the cotton balls were removed from the sockets and the patient was instructed to return if bleeding recurred.

CONCLUSION

The potassium chloride solution must be held in contact with the bleeding area long enough to allow sufficient and con-

tinued constriction of the smaller vessels involved. The medicament used can be subjected to sterilization without danger of reduced efficiency. No complaint of local irritation has been expressed when potassium chloride has been used in a tooth socket. Other potassium salts have not as yet been used in this particular type of clinical research. No unpleasant after-taste is experienced and a single application, properly made, is all that is necessary.

I realize that the cases reported are too few to allow sweeping conclusions; but they have a definite experimental basis, and as the treatment is harmless, I recommend that it be given a trial.

BIBLIOGRAPHY

1. McGuigan, H. A., and Higgins, J. A.: *Am. J. Physiol.*, 114:207, December, 1935. Camp, W. J. R., and Higgins, J. A.: *J. Pharm. & Exper. Therap.*, 57:376, August, 1936.

Report of Case of Fourth Molar

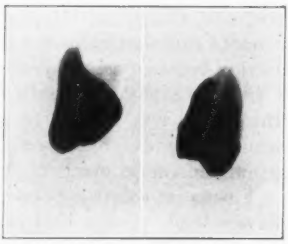
By J. JAC BANGEL, D.D.S.,
Portsmouth, Va.

A woman, aged 29, a nurse, complained of constant agonizing pain in the right ear and temporal region. She gave a history of one miscarriage and threatened miscarriage in a second pregnancy. She insisted that both right third molars be extracted although they were roentgenographically negative. About a year previously, I had extracted the lower left third molar, which had four well-formed hooked roots, and since then the patient had been wary of all third molars.

On extraction of the lower right third molar, identical roots in formation and number were found. Observation of the upper third (which was only partially erupted) after its removal, attracted attention to what appeared to be a grain of corn on the distal aspect at the bifurcation of the roots. Closer examination revealed that it was a fourth molar fused into the third.

In this case, the roentgen-ray examination was valueless and had the diagnosis and operative procedure been based on its disclosures, the patient would have continued to suffer.

As the dentin is equivalent to bone in hardness, how can the "stretchy," rolling and molded sections of the third molar into



Postextraction films. Left, buccolingual aspect; right, mesiodistal aspect.

which the fourth was being driven be accounted for?

Pressure on Mandibular Nerve with Anesthesia of Chin

By J. H. ELPHINSTONE, D.D.S.,
Aberdeen, Scotland

A middle-aged lady, with complete artificial dentures, complained that the lower denture caused anesthesia and radiating tingling sensations on the right side of her chin. She expressly mentioned she had no pain and the sensation was quite endurable. Her mandible was resorbed to the level of the mental foramen, and the supporting tissues for the artificial denture were poor. Immediate relief was obtained by filing away the denture over the mental foramen. It is the fourth similar case I have had.

PRACTICE IN PARAGRAPHS

This department is intended for busy readers. It aims to tell a vivid story in a few words. Items should be of a practical character, and free from padding—not more than a paragraph or two. We exact no limit, but two hundred words can tell most of these stories. Send in your ideas; they will be welcome.

Drum-head Cuspidor—When groping for small roots, parts of broken needles, instruments, etc., put a drum-head gauze over your cuspidor. Often these objects are ejected unknown to the operator or patient.—WILLIAM STANLEY CARRICK, Asbury Park, N. J.

Spraying Separating Solutions—Use a small spare tire sprayer for spraying separating solutions in impressions; connecting it to the air line supplies the necessary air pressure. It is a faster, easier and more efficient method than the old camel's-hair brush method.—LEON WEINSTEIN, Philadelphia, Pa.

Eccentricities vs. Just Ourselves—Daring to do differently and to be just ourselves often characterizes us as eccentric, which, when analyzed, in any language spells just "individualism." Many dentists possess and withhold invaluable ideas, simply for fear of being thought queer and straying from the beaten pathways.—HERBERT ELY WILLIAMS, Red Bank, N. J.

Office Improvement—If a dentist will sit in his own operating chair occasionally and survey the surroundings from the patient's point of view, he will surely see points here and there that can be improved; for instance, tiny blood spots high in the bowl which cannot be seen by the dentist from his usual working position, but which are particularly visible to the patient.—L. M. DAHL, Twin Valley, Minn.

MISCELLANY

CAN YOU IDENTIFY "JANE DOE, NO. 16"?

By HERBERT FINLEY, D.D.S.,
Los Angeles, Calif.

DENTISTS of the nation have been asked to help solve the famous "Jane Doe, No. 16" murder case which first shocked Hollywood and Los Angeles, November 17, 1936, when the body of a dark-haired woman was found near a rubbish heap in a dusty wash of the San Gabriel River.

The victim's name never has been learned. When taken to the Los Angeles County morgue, the body was tagged "Jane Doe, No. 16," and the case is known only by that title.

Clues by the hundred poured into the Hall of Justice and every one was diligently traced by Officers G. A. Morford and Arthur Fitzgerald of the Sheriff's Bureau of Investigation, who are assigned the bizarre case. Hundreds of persons were questioned, but each relentless effort led to naught.

Identification of an upper denture and eight lower teeth is the last chance, and officers cling to the hope that some dentist

may come forward with information that will establish the woman's individuality. Given her name, sleuths may seek out her enemies and trail the murderer to his lair. Balked by lack of a name, officers cannot even establish a motive for the ghastly crime.

Theories have been advanced that she may have been murdered elsewhere and carted to the scene in a trailer. The skull was badly crushed and evidence shows that she was unmercifully beaten about the head with a blunt instrument after she fell under the first blow inflicted from behind.

The woman's description is as follows:

Upper plate: Vulcanite; medium height; fair arch; gold-dust base; rubber-faced with mottled pink; stamped rugae and suction; no festooning. Teeth: Tru-byte, old style; mold C, shade 8; left central and cuspid teeth chipped; also right lateral.

Lower teeth: Six anterior teeth, cuspid to cuspid and lower left second bicuspid, (small space separating). Cavity in distal portion of right cuspid; no fillings; no clasp wear; good ridge.

She is further described as weighing about ninety-seven pounds, of slender build and five feet, three inches in height. She had dark brown hair, streaked with gray; hazel eyes and heavy dark eyebrows which join above the nose; no vaccination marks. There is a birthmark about the size of a silver dollar to the left of the spine and about four inches above the waistline. She was between forty and forty-five years of age.

Her clothing consisted of a long black coat with an imitation caracul collar and elbows; blue print house dress; badly worn black pumps of undetermined size, but her feet were short and wide. Brown stockings, held up by two cheap elastic garters on each leg, and a pink slip completed the costume.

The other clues include a heavy automobile jack and fragments of a bottle found near the body, prints of shoes and tires and a few strands of gray hair clutched in her fingers. The upper denture was found on the ground near her face, and scars in the earth disclose she struggled little after the first fatal blow, although her assailant hammered her small skull again and again in fiendish vehemence before leaving her to die.

404 S. Hill Street.

NEWS

Deaths

Erdheim, Jakob, Vienna, Austria; died suddenly on April 18, 1937, at the age of sixty-three. Prof. Erdheim, Director of the Pathologic Institute of the City Hospital, Vienna, was an internationally known pathologist, whose preferred field of investigation was the pathology of bone and calcification. His greatest contribution was his work on the parathyroids, their regulating influence upon the calcium metabolism and their relation to tetany. He was the first to demonstrate the sensitivity of the dentin of the rat's incisor to changes in the calcium metabolism, which laid the foundation for the experimental work on the endocrins and teeth which has been carried out in this country. Professor Erdheim's many friends and admirers throughout the world will remember him as an excellent teacher and as a true scientist.

Haskins, G. W., Evanston, Ill.; Chicago College of Dental Surgery, 1887; former faculty member of Northwestern University Dental School; died April 30; aged 78.

Hohman, Edward Herman, Chicago Ill.; Washington University School of Dentistry, 1903; died March 28; aged 57.

Miller, Francis Hincks, Aylmer, Ont., Canada; Chicago College of Dental Surgery, 1901; died April 16.

Ramsey, Scott, Milwaukie, Ore.; University of Pennsylvania, School of Dentistry; died February 16; aged 72.

Smith, Robert Guy, Norfolk, Va.; School of Dentistry, Medical College of Virginia, 1917; died recently.

Staehle, F. J., Chicago, Ill.; Chicago College of Dental Surgery, 1892; died April 30.

Ward, Harry, Brooklyn, N. Y.; New York University College of Dentistry, 1932; died April 18, of heart disease; aged 30.

ANNOUNCEMENTS

ANNOUNCEMENTS must be received by the fifth day of the month in order to be published in the forthcoming issue of THE JOURNAL.

CALENDAR OF MEETINGS

American Dental Association, Atlantic City, N. J., July 12-16.

American Academy of Periodontology, Atlantic City, N. J., July 8-10.

American Academy of Restorative Dentistry, Atlantic City, N. J., July 10-11.

American Society for the Promotion of Dentistry for Children, Atlantic City, N. J., July 12.

American Society of Oral Surgeons and Exodontists, Atlantic City, N. J., July 9-10.

Association of American Women Dentists, Atlantic City, N. J., July 12-16.

American Society for the Advancement of General Anesthesia in Dentistry, New York City, fourth Monday in March and October.

District of Columbia at George Washington University, Washington, D. C., second and fourth Tuesdays in each month from October to June, inclusive.

Greater New York Dental Meeting, New York City, December 6-10.

Australian Dental Congress, Sydney, August 16-20.

International Dental Federation, Stockholm, Sweden, August 9-14.

American Dental Society of Europe, Paris, France, August 2-5.

Montreal (Canada) Dental Club Fall Clinic, September 22-24.

American Dental Assistants Association, Atlantic City, N. J., July 12-16.

American Dental Hygienists Association, Atlantic City, N. J., July 12-16.

STATE SOCIETIES

June

Colorado, at Colorado Springs (10-12)
Idaho, at Boise
Maine, at Rangeley (25-26)
Nevada, at Reno (5)
New Hampshire, at North Conway (21-22)
New Mexico, at Albuquerque
Panama, at Colon (12)
Oregon, at Portland (23-25)
South Carolina, at Columbia (14-15)
Utah, at Logan (10-12)
Wyoming, at Casper (21-22)

September

Southern California, at Los Angeles (13-15)

November

Florida, at Hollywood (4-6)
Ohio, at Columbus (8-10)
Puerto Rico, at San Juan

December

Hawaii, at Honolulu

STATE BOARDS OF DENTAL EXAMINERS

Alabama, at Birmingham, June 21. James A. Blue, 1016 Comer Bldg., Birmingham, Secretary.

Arkansas, at Little Rock, June 14-17. Clarence W. Koch, 817 Donaghey Bldg., Little Rock, Secretary.

California, at San Francisco, May 24, and at Los Angeles, June 21. Kenneth I. Nesbitt, State Bldg., San Francisco, Secretary.

Connecticut, at Hartford, June 22-26. Almond J. Cutting, Southington, Recorder.

Delaware, at Wilmington, July 7-9. Charles R. Jefferis, 709 Medical Arts Bldg., Wilmington, Secretary.

Florida, at Jacksonville, June 21. H. B. Pattishall, 351 St. James Bldg., Jacksonville, Secretary.

Georgia, June 7. R. C. Coleman, Atlanta, Secretary.

Indiana, at Indianapolis, June 15. J. M. Hale, Mt. Vernon, Secretary.

Kentucky, June 15-18. Robert L. Sprau, 970 Baxter Ave., Louisville, Secretary.

Louisiana, at New Orleans, June 14-18. Joseph L. Webre, 740 Audubon Bldg., New Orleans, Secretary.

Maine, at Augusta, June 28-30. Fred B. Wheaton, 319 Main St., Biddeford, Secretary.

Massachusetts, at Boston, June 16-19. Frederick A. Keyes, 141 State House, Boston, Secretary.

Minnesota, at Minneapolis, June 18-24. Paul Hagen, Crookston, Secretary.

Mississippi, at Jackson, June 15. A. B. Kelly, Yazoo City, Secretary.

Montana, at Helena, June 28-July 1. Leonard A. Jenkin, 214 Medical Arts Bldg., Great Falls, Secretary.

New Jersey, June 28-July 2. Walter A. Wilson, 148 W. State St., Trenton, Secretary.

New Mexico, at Clovis, June 16-18. J. J. Clarke, Artesia, Secretary.

North Dakota, at Fargo, July 12-15. W. E. Cole, Bismarck, Secretary.

Ohio, at Columbus, June 28. Morton H. Jones, 1553½ North Fourth St., Columbus, Secretary.

Pennsylvania, at Philadelphia and Pittsburgh, July 15-19. W. A. McCready, Highland Bldg., Pittsburgh, Secretary.

Rhode Island, at Providence, June 23-25. Robert D. Wholey, Providence, Chief, Division of Examiners.

South Carolina, at Columbia, June 10-12. T. C. Sparks, Medical Bldg., Columbia, Secretary.

South Dakota, at Sioux Falls, June 28-July 1. H. W. Thomas, Aberdeen, Secretary.

Texas, at Dallas, June 7-10. B. Carl Holder, Nixon Bldg., Corpus Christi, Secretary.

Utah, June 21. Barlow Fox, Deseret Bank Bldg., Salt Lake City, Secretary.

Vermont, at Montpelier, June 28-30. H. B. Small, Burlington, Secretary.

Virginia, at Richmond, June 15. John M. Hughes, 715 Medical Arts Bldg., Richmond, Secretary.

West Virginia, at Charleston, June 28-30. Henry C. Hill, Dominion Bldg., Secretary.

Wisconsin, at Milwaukee, June 21-25. S. F. Donovan, Tomah, Secretary.

Dental Corps, U. S. Army, June 14-19, Washington, D. C., Denver, Colo., San Francisco, Calif., and San Antonio, Texas. Adjutant General, U. S. Army, Washington, D. C.

Dental Corps, U. S. Navy, July 19, Washington, D. C., Great Lakes, Ill., and San Diego, Calif. Surgeon General, U. S. Navy, Washington, D. C.

NINTH AUSTRALIAN DENTAL CONGRESS

The Ninth Australian Dental Congress will be held August 16-20, at Sydney, New South Wales. The president is Sir Harry Moxham, Kt., D.D.S., F.A.C.D., and the Secretary-General and Treasurer, Percy A. Ash, D.D.S., F.A.C.D.

TESTIMONIAL DINNER FOR DR. CONZETT

The Dubuque County Dental Society Dubuque, Iowa, will honor John V. Conzett at a testimonial dinner, June 14, in celebration of his fifty years in the practice of dentistry in Dubuque. The committee in charge consists of R. H. Volland, honorary chairman, L. M. FitzGerald, chairman, H. M. Willits, P. H. Sheridan, H. J. Altfillisch and W. J. Baumgartner.

For further information or reservations, address the chairman, 718 Roshek Building, Dubuque, Iowa, before June 1.

DENTAL ASSISTANTS

Are you a member of your local dental assistants association? Have the dental assistants in your community organized?

A group can be easily organized and the results will be well worth the time and efforts spent. If your community already has a dental assistants organization, and you are not a member, join now and take advantage of the opportunities offered.

From July 12 to 16, members of the Dental Assistants Association of the United States and Canada will meet in Atlantic City, N. J. Plan now to spend your vacation in Atlantic City—the convention city.

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UNITED STATES PATENTS APPLICABLE OR PERTAINING TO DENTISTRY

ISSUED DURING APRIL 1937

April 6

Reissue No. 20,323, to MORRIS RUDOF. Method of Making Tooth Brushes.

No. 2,076,121, to FAIRLEIGH S. DICKINSON. Hypodermic Syringe Needles' Hub.

No. 2,076,449, to FREDERICK H. DONER. Dental Instrument.

April 13

No. 2,076,526, to ELMER H. BROWN. Surgical Packing.

No. 2,077,012, to KARL ROSS. Means for Building Dentures.

No. 2,077,245, to JAMES D. LOCKE. Oral Cavity Appliance.

April 20

No. 2,077,392, to CHESTER V. BOYD. Toothbrush.

No. 2,077,418, to ERNEST BYRON KELLY. Dental Impression Paste.

No. 2,077,540, to HARRY LOGUE WELKER. Dental Cleansing and Massage Device.

No. 2,077,758, to JOHN CLIFFORD JOHNSON. Tooth Brush.

April 27

No. 2,078,498, to EMIL KLARMANN and LOUIS W. GATES. Dentifrice.

No. 2,078,567, to RICHARD V. FOREGGER. Oxygen Emergency Apparatus.

No. 2,078,647, to JOHN WAHLBERG. Removable Denture.

No. 2,078,853, to CARROLL W. JOHNSON and LOUIS SPINAR. Removable Dental Bridge.

No. 2,078,890, to FRANK E. FOLLETT. Dental Fountain.

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